Final

Five-Year Review Report

Naval Station Norfolk Norfolk, Virginia



Prepared for

Department of the Navy Atlantic Division Naval Facilities Engineering Command

Norfolk, Virginia

Contract No. N62470-95-D-6007 CTO-0251

October 2003

Prepared by

CH2MHILL

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This report documents the completion of the five-year review for sites 1, 2, 3, 6, and 20 at Naval Station Norfolk as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in accordance with CERCLA §121(c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR).

Approved by:

Michael K. Loose

Date

Rear Admiral, Civil Engineer Corps, USN

Commander, Atlantic Division, Naval Facilities Engineering Command

Executive Summary

CH2M HILL conducted this Five-Year Review Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Review for Naval Station Norfolk (NSN) in Norfolk, Virginia, in accordance with the U. S. Environmental Protection Agencies (USEPA) Five-Year Review Guidance (USEPA, June 2001). The document addresses remedies and remedial actions that resulted in hazardous substances, pollutants, or contaminants remaining at sites above levels that allow for unlimited use and unrestricted exposure; and for which there is a Record of Decision (ROD) or Decision Document (DD) in place. The five sites incorporated in this review include Site 1—Camp Allen Landfill (CALF), Site 2—NM Slag Pile, Site 3—Q Area Drum Storage Yard (QADSY), Site 6—CD Landfill, and Site 20—Building LP-20.

The Five-Year Review's objective is to evaluate current remedies at these sites and determine whether the remedies are protective of human health and the environment in accordance with the requirements set forth in the ROD or DD. The principal method used to evaluate the protectiveness of the remedies was a review of various reports and documents pertaining to site activities, analytical data, and findings. The methods, findings, and conclusions from the document reviews are presented in this Five-Year Review report. In addition, the Five-Year Review report identifies any issues that may prevent a particular remedy from functioning as designed or appropriate and may endanger the protection of human health and the environment. The overall evaluation of the effectiveness of each remedy is presented as a protectiveness statement developed for each site. The protectiveness statements are provided below.

Site 1—Camp Allen Landfill

The current operation of the groundwater extraction and treatment at Camp Allen Landfill was found to be protective of human health and the environment. The extraction system has prevented migration of the contaminant plume to residential areas west and southeast of the site. However, as part of an ongoing optimization effort, the treatment system will be expanded with the addition of new extraction wells to contain the plume north of the site and southeast of the elementary school.

Site 2—NM Area Slag Pile

The remedy for Site 2—NM Slag Pile is protective of human health and the environment under the current industrial land use.

Site 3—Q Area Drum Storage Yard

The current air sparge/soil vapor extraction (AS/SVE) system at the QADSY was found to be protective of human health and the environment. The AS system in AOC 2 is operating and VOC mass continues to be removed from the groundwater at a significant rate. The

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remediation in AOC 1 has achieved the cleanup goals in those monitoring wells within the radius of influence of the AS system. However, the monitoring wells downgradient of the system have demonstrated increases in the concentrations of VOC breakdown product-vinyl chloride. As part of an ongoing optimization effort, an enhancement of the remediation system is currently being considered in the localized area of increased vinyl chloride concentrations. The system's enhancement is targeted for reduction in the vinyl chloride concentrations to achieve the acceptable levels such that the closeout strategy developed by the NSN Tier I Partnering Team can be achieved.

Site 6—CD Landfill

The current landfill cap and institutional controls at CD Landfill were found to be protective of human health and the environment. The Navy Public Works Center (PWC) inspects the CD Landfill quarterly and an outside contractor does so annually. The 2002 annual inspection identified minor maintenance issues that did not impact the integrity of the remedy or institutional controls at the CD Landfill. The minor issues include:

- Small damage to the top of fence that does not impact security
- Erosion of a portion of sideslope in a drainage channel that does not affect the cover's integrity as it is on the opposite side of the landfill
- Erosion near the downstream ends of the culverts that appears to be stabilizing with vegetation
- Potential sedimentation of drainage net outlet pipes; however, this is not an issue as there are other visible outlets from drainage net.

It is recommended that the maintenance issues continue to be monitored during the inspections to make certain they will not have an impact on the remedy.

Site 20—Building LP-20

The current AS/SVE system at Building LP-20 was found to be protective of human health and the environment. The system has been effective in reducing the VOC concentrations within the contaminant plume. Additional evaluation of the effectiveness of the system and potential for optimization will be conducted.

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Acronyms and Abbreviations

AOC Area of Concern

ARAR Applicable or Relevant and Appropriate Requirement

AS/SVE air sparge/soil vapor extraction aboveground storage tank

CALF Camp Allen Landfill

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CLEAN Comprehensive Long-term Environmental Action Navy

COC chemicals of concern

DD Decision Document

DPVE Dual Phase Vapor Extraction

ERM Effects Range-Median

HM hazardous material

IAS Initial Assessment Study

IRP Installation Restoration Program

LANTDIV the Atlantic Division

LTM Long-Term Monitoring (LTM

msl mean sea level

NAS Naval Air Station

NCP National Contingency Plan NPL National Priorities List NSN Naval Station Norfolk

OU Operable Unit

PAH polynuclear aromatic hydrocarbon

PA/SI Preliminary Assessment/Site Investigation

PCB Polychlorinated Biphenyls

PP petroleum product

PRAP Proposed Remedial Action Plan

PWC Navy Public Works Center

QADSY Q Area Drum Storage Yard

RBC Risk-Based Concentration

RI/FS Remedial Investigation/Feasibility Study
RI/RA Remedial Investigation/Risk Assessment

ROD Record of Decision

SI

Site Investigation

SVOC

semivolatile organic compound

TPH

total petroleum hydrocarbon

USEPA

U. S. Environmental Protection Agencies

VDOT

Virginia Department of Transportation

VOC

volatile organic compound

SECTION 1

Introduction

CH2M HILL conducted a Five-Year Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Review under the Atlantic Division, Naval Facilities Engineering Command Comprehensive Long-term Environmental Action Navy (CLEAN) II Program, Contract No. N62470-95-D-6007, Contract Task Order 0251. The Five-Year Review was prepared for Naval Station Norfolk (NSN) in Norfolk, Virginia, in accordance with the Comprehensive Review Guidance (USEPA, June 2001). This document addresses remedies and remedial actions regarding hazardous substances, pollutants, or contaminants remaining at sites above levels that allow for unlimited use and unrestricted exposure; and for which there is a Record of Decision (ROD) or Decision Documents (DD) in place. This report includes a review of the remedial actions at five sites at NSN and was conducted from July 1 to September 30, 2002. These five sites include: Site 1—Camp Allen Landfill (CALF), Site 2—NM Slag Pile, Site 3—Q Area Drum Storage Yard (QADSY), Site 6—CD Landfill, and Site 20—Building LP-20.

The objective of this Five-Year Review is to evaluate current remedies at these five sites and determine whether the remedies are protective of human health and the environment in accordance with the requirements outlined in the Records of Decision (RODs) or Decision Documents (DDs). The principal method used to evaluate the protectiveness of the remedies was a thorough review of reports, analytical data, and documents pertaining to site activities and findings. This report presents the methods, findings, and conclusions from the document reviews. In addition, the Five-Year Review identifies any issues that may prevent a particular remedy from functioning as designed or as appropriate, which could endanger the protection of human health and the environment.

This Five-Year Review was prepared pursuant to CERCLA 121 and the National Contingency Plan (NCP) requirements. A Five-Year Review is required 5 years from the initiation of the first remedial action that leaves hazardous substances, pollutants, or contaminants remaining at sites above levels that allow for unlimited use and unrestricted exposure. If a site contains multiple remedies, all are subject to a Five-Year Review when at least one remedy is triggered. NSN has elected to follow Navy recommendations of conducting an installation-wide Five-Year Review that includes all sites with remedies in place based on the remedy initiation trigger date for the first site.

CH2M HILL prepared this Five-Year Review pursuant to CERCLA 121 and the NCP. CERCLA 121 states:

If the president selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such

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action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

USEPA interpreted this requirement further in the NCP; 40 CFR 300.430 (f)(4)(ii), which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the first Five-Year Review for NSN. The triggering action of this statutory review is the initiation of the selected remedial action for the CALF dated August 1995. The Five-Year Review is required because hazardous contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

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Background

In support of the Five-Year Review, the presentation of background information for NSN is necessary to identify the potential threats that were posed to the public and the environment at the time of the ROD or DD for each site. This allows for the remedy performance to be compared with the site conditions that the remedies were intended to address. Information presented in this section includes a discussion of the facility description, physical characteristics of the facility, listing of chronological events, and site-specific background information.

2.1 Facility Description

NSN is the world's largest naval base, encompassing 4,631 acres in the northwest portion of the City of Norfolk, Virginia. A map of NSN and the relative location of the sites evaluated in this report are shown in Figure 2-1. NSN includes approximately 4,000 buildings, 20 piers, and an airfield. The western portion of NSN is a developed waterfront area containing the piers and facilities for loading, unloading, and servicing naval vessels. Land use in the surrounding area is commercial, industrial, and residential. The waterfront area south of the NSN provides shipping facilities and a network of rail lines for several large industries.

NSN began operations in 1917, when the U.S. Navy acquired 474 acres of land to develop a naval base to support World War I activities. Bulkheads were built along the coast to extend available land and after extensive dredge and fill operations, 792 acres were under Navy control.

An additional 143 acres were acquired in 1918 and officially commissioned for the Naval Air Station (NAS). From 1936 through 1940, improvements to the piers and expansion of supply/material handling facilities were also completed.

During World War II, major construction projects were completed, including a power plant, numerous runways and hangars, a tank farm, and several barracks/housing complexes. During this time, the area of NSN expanded to more than 2,100 acres. After World War II, NSN continued to acquire land through various types of land transfers and dredge-and-fill operations conducted in areas of Mason Creek, the Bousch Creek Basins, and Willoughby Bay.

NSN has expanded to become the world's largest naval installation, with 105 ships home-ported in Norfolk. The Base currently has 20 piers handling approximately 3,100 ship movements annually. NSN operates in various capacities to provide support to vessels, aircraft, and other activities. NSN houses many tenants, each performing different operations involving the servicing and maintenance of vessels and aircraft.

Ship service and maintenance facilities include utilities hook-up, on-board maintenance, and coordination of ship movements in the harbor. Additional functions include loading, unloading, and handling of fuels and oils used aboard the vessels. Ship and aircraft repair

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operations consist of paint stripping, patching, parts cleaning, repainting, engine overhauls, and sandblasting processes.

NSN's mission is to provide fleet support and readiness for the U.S. Atlantic Fleet.

A number of other military installations are located within a 25-mile radius of NSN—Fort Monroe and Langley Air Force Base to the north, Little Creek Naval Amphibious Base and Fort Story to the east, Naval Air Station Oceana to the southeast, Norfolk Naval Shipyard and St. Juliens Creek Annex to the south, and Naval Supply Center-Craney Island Fuel Terminal to the southwest (CH2M HILL, October 1997).

2.2 Physical Characteristics

The major physiographic features of NSN and surrounding area are described in the following subsections.

2.2.1 Climate

The Hampton Roads Area has a maritime climate characterized by long temperate summers and mild winters. The average annual temperature is 60.7 °F. July is the warmest month, with temperatures averaging 78.7 °F, while January is the coolest, with temperatures averaging 43.1 °F. Precipitation averages 43 inches annually and is evenly distributed throughout the year. A slight increase in precipitation occurs from June to August due to the prevalence of convective thunderstorms. The average annual snowfall is 8.8 inches. Winds are generally in an easterly direction and of moderate speed, ranging from 6 to 8 knots (CH2M HILL, October 1997).

2.2.2 Topography

The topography of NSN is nearly level. Surface elevations at the base range from sea level to about 15 feet above mean sea level (msl) in the central portion of the base.

2.2.3 Soils

Soils at NSN generally consist of fine sands and silts with a thickness of 20 to 40 feet having low to moderate permeability. Relatively impermeable sediments composed of silt, clay, and sandy clay typically underlie this upper layer of soils. Together, these strata have a combined thickness of approximately 60 feet. The average permeability of soils in Norfolk County is less than 2.5 inches per hour.

The soils at NSN are a complicated distribution of naturally occurring material and dredge-and-fill material. The native soils are composed of unconsolidated fine sands and silts of low to moderate permeability and are generally underlain by relatively impermeable sediments consisting of silt, clay, and sandy clay. The fill material is primarily composed of heterogeneous sediments removed during dredging operations. The composition of the dredge-fill sediments varies from site to site, but it is generally composed of sand, silt, and gravel. Some concrete, stone, and miscellaneous debris were also used as fill material (CH2M HILL, October 1997).

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2.2.4 Surface Water Resources

Four major surface water features surround the greater Norfolk area including the James and Elizabeth Rivers, Willoughby Bay, and Chesapeake Bay, all of which are tidal. Most surface water on the base flows either to Mason Creek or to the remnants of Bousch Creek. The northernmost channel of Mason Creek traverses the base and empties into Willoughby Bay via a subgrade aqueduct. The main channel of Bousch Creek was filled in and replaced by a network of drainage ditches during the base's development. These narrow drainage channels are interspersed throughout the central part of the base. Both Mason Creek and these drainage ditches are tidal throughout the base. Both creeks discharge to Willoughby Bay and ultimately, to the Chesapeake Bay. Some surface water from the base discharges directly into the Elizabeth River (CH2M HILL, October 1997).

2.2.5 Geology and Hydrogeology

NSN is located in the outer Atlantic Coastal Plain Physiographic Province, which is characterized by low elevations and gently sloping relief. The base is underlain by more than 2,000 feet of gently dipping sandy sediments. Table 2-1 illustrates the stratigraphic hydrogeologic units of southeastern Virginia.

The uppermost geologic unit is the Columbia Group, which is approximately 60 feet thick. The upper 20 to 40 feet consist of unconsolidated fine sands and silts. These sediments possess low to moderate permeabilities and comprise the unconfined Columbia aquifer. The lower 20 to 40 feet consist of relatively impermeable silt, clay, and sandy clay.

The Chesapeake Group underlies the Columbia Group. The uppermost unit in the Chesapeake Group is the Yorktown Formation. It is capped by the Yorktown confining unit, which separates the Columbia aquifer from the underlying Yorktown aquifer. The Yorktown formation is approximately 90 to 100 feet thick in the vicinity of NSN and composed of marine silt and clay and moderately consolidated coarse sand and gravel with abundant shell fragments. The Chesapeake Group is composed of several additional deeper aquifers and confining units.

Two significant shallow aquifer systems in the area are the Columbia aquifer located in the upper 20 to 40 feet of the Columbia Group, and the underlying Yorktown Aquifer. The Columbia aquifer includes the water-table aquifer, is reportedly thin, and consists of discontinuous heterogeneous sand and shell lenses. The water table depth is usually less than 8 feet. The Yorktown Aquifer is semi-confined beneath a clay layer in the upper Yorktown Formation. Water-bearing zones in the Yorktown Aquifer consist of fine to coarse sand, gravel, and shells (CH2M HILL, October 1997).

2.3 Site Chronology

Historical land use and practices at Naval Station Norfolk resulted in the contamination of the environment in some areas. The CALF, NM Slag Pile, QADSY, CD Landfill, and Building LP-20 were identified as sites where remediation was required. The following timelines for these five sites present the significant events that have occurred prior to this review.

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2.3.1 Site 1—Camp Allen Landfill

1940s – 1974 Use of Area A to dispose of municipal, solid, and hazardous wastes.

1971 Use of Area B to dispose of wastes from a fire at Camp Allen Storage

Yard

1983 CALF identified as a potential source of contamination in the Initial

Assessment Study (IAS)

1988 Installation Restoration Program Investigation Interim Report

completed

May 1994 Non-time-critical soil removal action implemented in Area B

1994 Remedial Investigation/Feasibility Study (RI/FS) completed

1995 Proposed Remedial Action Plan (PRAP) completed and DD signed

April 1997 Naval Station Norfolk placed on the National Priorities List (NPL)

1997 Construction of the groundwater extraction and Dual Phase Vapor

Extraction (DPVE) system

1998 Continuous operation of the groundwater extraction and DPVE

system begun.

1999 Implementation of annual Long-Term Monitoring (LTM)

2.3.2 Site 2—NM Slag Pile

1950s-'60s Disposal of slag, fly ash, and/or bottom ash at the site

1983 Slag Pile identified as a potential source of contamination in the IAS

April 1997 Naval Station Norfolk placed on the NPL

August 1998 RI completed

September 1998 FS completed

1999 PRAP completed

September 1999 Remedial Action Design completed

November 1999 Sediment removal action completed

February 2000 Placement of the soil and asphalt cover was completed

October 2000 Implementation of annual LTM

December 2000 ROD signed

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2.3.3 Site 3—Q Area Drum Storage Yard

1950s-'80s Area was used to store drums

1983 Area identified as a potential source of contamination in the IAS

1987 Soil removal action completed

1988 Interim RI completed

1996 RI/FS completed

1996 PRAP completed and Decision Document signed

April 1997 Naval Station Norfolk placed on the NPL

1997 Construction of the air sparge/soil vapor extraction system

August 1998 Remediation system began operation February 1999 Implementation of the biannual LTM

September 1999 System operation was modified to a 2-week cycle of pulsing

2.3.4 Site 6—CD Landfill

1974-1979 Disposal of material in the unpermitted (eastern) section of the landfill

October 1979 Virginia Department of Health issued a permit for disposal of

demolition debris and non-putrescible wastes at the site

1979-1987 Disposal of material in the permitted (western) section of the landfill

1983 CD Landfill identified as a potential source of contamination in the IAS

1991 Site Investigation (SI) completed

1993 Seabee Road was constructed over the site

1995 RI completed

July 1996 FS completed

October 1996 PRAP completed and Decision Document signed for site sediment-

Operable Unit (OU) 1

April 1997 Naval Station Norfolk placed on the NPL

1997 Removal of contaminated sediments

1998 PRAP completed and ROD signed for site soil and groundwater (OU2)

December 1999 Construction of the landfill cap was completed

December 1999 Post-Closure Plan was completed

2000-2001 Quarterly groundwater and surface water monitoring conducted

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March 2001

First Annual Post-Closure Monitoring Report completed

February 2002

Second Annual Post-Closure Monitoring Report completed

June 2002

Biannual LTM implemented

2.3.5 Site 20—Building LP-20

1940s-1990s

Numerous spills and releases documented in the area

Circa 1986

Product Recovery System #1 installed

Circa 1988-1990

Product Recovery System #2 installed

1991

Preliminary Assessment/Site Investigation (PA/SI) completed

December 1994

Product Recovery Systems shut down and dismantled

1995

RI/FS completed

1996

PRAP completed and Decision Document signed

April 1997

Naval Station Norfolk placed on the NPL

1997

Construction of the air sparge/soil vapor extraction system

April 1998

Remediation system began operation

November 1998

Annual LTM initiated

2.4 Description and Characterization of Sites

2.4.1 Site 1—Camp Allen Landfill

The Camp Allen Landfill site includes two distinct areas (Area A, the 45-acre landfill, and Area B, the 2-acre fire disposal area), as shown in Figure 2-2. The Area A landfill, which operated from the mid-1940s until approximately 1974, was used for the disposal of metal plating and parts-cleaning sludge, paint-stripping residue, various chlorinated organic solvents, expired chemicals, pesticides, asbestos, incinerator ash, fly and bottom ash from the Base power plant, and miscellaneous debris. Wastes from a fire at the Camp Allen Salvage Yard (Site 22), including drums containing various chemicals, were buried in trenches at Area B in 1971.

Currently, the Base brig facility and a heliport are located over a portion of the Area A landfill. Area B is not used at the present time. Areas A and B are soil-covered and vegetated to minimize surface erosion as they are both adjacent to tidal drainage ditches that convey stormwater runoff to Willoughby Bay.

The potential for site contamination from disposal practices was initially identified in the 1983 IAS (Environmental Science & Engineering, February 1983). Field investigations were conducted from 1983 to 1987 to characterize the nature and extent of contamination at the site. In March 1988 an Interim RI report (Malcolm Pirnie, May 1988) was completed.

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Additional groundwater and soil gas samples were collected from 1990 to 1991 and an RI/FS report (Baker Environmental, Inc., July 1994).

Contamination from prior disposal practices at the Camp Allen Landfill has affected surface and subsurface soil, sediment, surface water, and groundwater. The primary contaminants found at the site in all media are volatile organic compounds (VOCs). Two primary source areas of VOCs were identified north (Area A2) and south (Area A1) of the existing brig facility (Baker Environmental, Inc., July 1994). Areas of inorganic contamination of surface water and sediments in the surrounding drainage ditches and in the onsite pond also were detected. Groundwater contamination was found in both the water-table aquifer and the Yorktown Aquifer in Areas A and B. The presence of contamination in the deeper Yorktown Aquifer is thought to be due to the breach of a confining layer between the two aquifers beneath much of the Camp Allen Landfill area.

2.4.2 Site 2—NM Area Slag Pile

The NM Slag Pile (Figure 2-3) is a 1-acre disposal area for slag generated by an aluminum smelting operation during the 1950s and 60s. The slag is a residual cinder material formed from the fusion of a mineral such as limestone with impurities from the aluminum ore and ash from the blast-furnace fuel. In order to create a level surface upon which the slag could be deposited, fly ash and/or bottom ash (derived from coal burning operations elsewhere at NSN) was also used as fill material at the site. During the smelting operation, the slag pile area was defined by a lack of vegetation around the site near the slag pile. The site's surface has since been regraded and vegetation was planted. Prior to remediation activities, the site's surface consisted of a gravel parking lot and open grassy field.

The potential for site contamination from metals—including chromium, cadmium, and zinc—was identified in the IAS (Environmental Science & Engineering, February 1983). Trace amounts of inorganics were detected in surface soil, surface water, and sediment samples taken during the Interim RI (Malcolm Pirnie, May 1988). However, the samples were taken after site regrading and placement of gravel surfacing. Since these activities disturbed the surface soil, these analytical results may not be representative of activities at the site.

The 1998 RI (CH2M HILL, August 1998) conducted at the site concluded that the disposal activities had impacted the site's groundwater and soil as well as sediment and surface water in the adjacent drainage channel. In correlation with the type of material disposed of at the site, the primary contaminants consist of metals—arsenic, antimony, cadmium, chromium, copper, iron, lead, nickel, silver, and zinc. However, significant concentrations of the organic chemicals 4-4'DDE and trichloroethene were also detected. Sediment and surface soil sampling was conducted in February 1998 to delineate the contamination limits for a sediment removal action.

2.4.3 Site 3—Q Area Drum Storage Yard

The Q Area Drum Storage Yard was a site that occupied approximately 5 acres in the northwest corner of NSN near the aircraft carrier piers (Figure 2-4). This area was created by dredging operations in the early 1950s. The QADSY was an open earthen yard used from

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the 1950s until the late '80s to store thousands of drums, most of which contained new petroleum products, various chlorinated organic solvents, paint thinners, and pesticides.

The potential for site contamination from drum storage activities was initially identified in the 1983 IAS (Environmental Science & Engineering, February 1983). The initial site visit noted dark stains on the soil and oil-saturated soil throughout the storage yard, indicative of past spills. The yard's northern portion, which was used to store leaking or damaged drums and hazardous materials, was particularly stained. The drums have since been removed, and the site was paved for its current use as a parking lot.

Field investigations were conducted from 1983 to 1986 to characterize the nature and extent of contamination at the site. The analytical results indicated that soil and groundwater were contaminated with metals and VOCs. In 1988 an Interim RI report (Malcolm Pirnie, May 1988) was completed. Additional soil, groundwater, sediment, and surface water samples were collected from 1990 to 1993.

The RI/FS (Environmental Science & Engineering, Inc., May 1996) conducted at the site revealed that the site was primarily contaminated with total petroleum hydrocarbons (TPH) and VOCs. In addition, some small-scale contamination of semivolatile organic compounds (SVOCs), metals, and pesticide was present. The shallow groundwater beneath the hazardous materials (HM) area and the northern portion of the petroleum products (PP) area was impacted the most. Some low VOC levels were also observed in the deep wells. This may be due to the lack of a confining layer between the two aquifers in this area. The general extent of the groundwater plume, which affects approximately 29 acres beneath the fleet parking area west of the site, has been defined with monitoring-well and direct-push groundwater sampling. As a result of the delineation, the Q-Area has been subdivided into Area of Concern (AOC) 1 and AOC 2 to reflect two distinct plumes consisting of high concentrations of VOCs.

2.4.4 Site 6—CD Landfill

The CD Landfill site occupies approximately 22 acres and is just east of Hampton Boulevard and south of the Naval Exchange, as illustrated in Figure 2-5. The site incorporates two areas of landfilling operations; the easternmost (unpermitted) section and the western (permitted) section. The unpermitted portion operated from 1974 to 1979 and was used for demolition debris and inert solid waste, fly ash, and incinerator residue (CH2M HILL, February 2002).

In October 1979, the Naval Facilities Engineering Command received a permit from the Virginia Department of Health to use the landfill (western portion) for disposal of demolition debris and other non-putrescible wastes, excluding fly ash, incinerator residues, chemicals, and asbestos. Blasting grit used for sandblasting cadmium-plated aircraft parts was deposited at the landfill until 1981 when the blasting grit was tested and found to exceed the EP toxicity limit for cadmium. The grit was classified as a hazardous waste and onsite disposal of the material ceased. Landfilling operations continued in the site's western portion of the site. At the time the landfill permit was granted, a portion of the site's southeastern corner was removed and regraded to allow for runway expansion at the Naval Air Station (NAS). The runway expansion design specified that excess material was to be spread over the landfill and not removed from the site.

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In 1993, Seabee Road was constructed over the site and opened to the public. Construction plans required only the addition of fill material; no cutting or grading into the existing landfill occurred. Most of the existing debris mounds situated in the north-central portion of the landfill were leveled and spread around the site to reduce the amount of standing water that accumulated after rain events.

The results of several investigations guided the scope of the RI, performed in 1993 and 1994. The RI was completed in three separate rounds of sampling. Soil, sediment, groundwater, and surface water samples were collected. As a result of the Remedial Investigation/Risk Assessment (RI/RA) Report, an FS was prepared in July 1996 to address contaminated media at the CD Landfill site. Potential risks associated with contaminants in the soil, sediments, groundwater, and surface water were identified and guided the development and evaluation of the media-specific remedial action alternatives. In addition to the FS, a separate geostatistical analysis was performed to evaluate and better define the areas of sediment contamination.

The RI (Baker Environmental, Inc., December 1995) conducted at the site concluded that the landfill activities had impacted the surface soil, subsurface soil, sediment, surface water, and shallow groundwater. The chemicals of concern (COCs) per media are summarized below:

- Soil The most prevalent constituents are arsenic, beryllium, lead, and manganese.
 Additionally, constituents detected less frequently but at significant levels are antimony, cadmium, chromium, copper, nickel, vanadium, and zinc.
- Shallow groundwater One organic compound (chlorobenzene) and several metals including arsenic, beryllium, chromium, lead, and manganese.
- Surface water 1,4-dichlorobenzene as well as lead and arsenic.
- Sediment acetone, chlorobenzene, several polynuclear aromatic hydrocarbons (PAHs), pesticides, and PCBs.

In June 1997, the Partnering Team agreed to an additional sampling event to characterize the landfill material and determine closure requirements. A statistical sampling approach was developed to determine within a specified confidence interval whether the fill material would be classified as hazardous. All of the samples collected and analyzed during the June event were below the regulatory standards. Based on the statistical findings, the fill material at the CD Landfill is not considered a hazardous waste and it was agreed that the site would be closed under the Virginia Solid Waste Management Regulations for a construction demolition debris landfill.

2.4.5 Site 20—LP-20 Site

The LP-20 Site is one of many large buildings northwest of the NAS main runway, as shown in Figure 2-6. Currently, the building houses the Navy Public Works Center's (PWC's) Transportation Department. In the past, a portion of the building was used for aircraft engine overhaul and maintenance. Previous activities at the building included: painting, x-ray facilities, cleaning and blasting, and a metal-plating operation. Waste products generated from these activities were transferred to the industrial wastewater treatment plant via underground piping. In addition, a large fuel storage area, known as LP fuel farm,

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is also located south of the building. An underground pipeline extends from the Fuel Farm to buildings LP-78 and LP-176 located east of the site. Over the years (1940s to 1990s), Numerous spills or releases of wastewater and petroleum have been documented over the years (1940s to '90s). Significant releases were associated with damage to underground wastewater lines during construction activities, and leakage of the underground petroleum pipeline (Baker Environmental, Inc., December 1995).

Investigations at the site began in 1986 following a release of JP-5 fuel from the underground pipeline. Since 1986, approximately 10 separate investigations have been conducted to evaluate the extent of releases from underground fuel pipelines, the industrial wastewater line, and various underground storage tanks (USTs) at the site. These investigations determined that significant amounts of free product as well as chlorinated solvents are present. A RI/FS (Baker Environmental, Inc., December 1995) summarizing the previous investigation data was completed in 1995.

The data generated during the RI (Baker Environmental, Inc., December 1995) indicate that VOCs are the primary contaminants detected in the area. Specifically, chlorinated solvents were detected in the vicinity of LP-20 and LP-26. In addition, petroleum products occur east of Building LP-22 and south of Building LP-179 and are being handled as part of the Underground Storage Tank Program. High concentrations of vinyl chloride, 1,1-dichloroethene, 1,2-dichloroethene, 1,2-dichloroethene, and benzene were observed in the shallow aquifer (Columbia). Furthermore, concentrations of vinyl chloride, 1,2-dichloroethene, and trichloroethene were also detected in the deep aquifer (Yorktown).

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TABLE 2-1Stratigraphic and Hydrogeologic Units of Southeast Virginia (from Harsh and Laczniak, 1990)

Geologic Age		Group		Hydrogeologic Unit	
Period Epoch			Stratigraphic Formation		
0	Holocene	Columbia	Holocene Deposits	Columbia aquifer	
Quaternary	Pleistocene	Columbia	Undifferentiated Deposits	Columbia aquirei	
	Pliocene		Bacons Castle Formation	Yorktown confining unit	
	1 nocene		Yorktown Formation		
		Chesapeake	Eastover Formation	Yorktown-Eastover aquifer	
				Ot Mondo aculinina mit	
			St. Mary's Formation	St. Mary's confining unit	
	Miocene			St. Mary's Choptank aquifer	
			Choptank Formation		
Tertiary			Calvert Formation	Calvert confining unit	
	Oligocene	- Pamunkey	Old Church Formation	Chickahominy-Piney Point aquifer	
			Chickahominy Formation		
	Eocene		Piney Point Formation		
			Nanjemoy Formation	Nanjemoy-Marlboro Clay confining unit	
	Paleocene		Marlboro clay	,	
			Aquia Formation	Aquia aquifer	
			Brightseat Formation	Brightseat confining unit	
			.	Brightseat aquifer	
	Late Cretaceous		Undifferentiated Sediments	Upper Potomac confining unit	
			Potomac Formation	Upper Potomac aquifer	
Cretaceous	Early Cretaceous			Middle Potomac confining unit	
				Middle Potomac aquifer	
				Lower Potomac confining unit	
				Lower Potomac aquifer	

Remedial Actions

3.1 Site 1—Camp Allen Landfill

3.1.1 Remedy Selection and Implementation

A DD (Baker Environmental, Inc., November 1993) was signed in November 1993 for removal of the contaminant source (buried debris and impacted soil) from Area B of the Camp Allen Landfill. A non-time-critical removal action was implemented in May 1994 and completed in January 1995. Approximately 11,500 tons of soil and debris were excavated and disposed offsite to remove the primary source areas of contamination in Area B. The extent of the removal action is shown in Figure 3-1.

A PRAP (Baker Environmental, Inc., March 1995) and second DD (Baker Environmental, Inc., July 1995) were issued in 1995 detailing localized treatment of groundwater and soil using vacuum extraction. In addition, the site's remediation required implementation of a groundwater extraction and treatment system in Areas A and B, and DPVE for "hot spots" identified in the Area A landfill. The established cleanup goals are given in Table 3-1 and the remedial actions are summarized below:

Area A1

- Treatment of the soil and water table aquifer using a DPVE system in combination with institutional controls that control access to the site and incorporate land and groundwater use restrictions.
- Treatment of the Yorktown aquifer through deep extraction wells that pump the groundwater to an onsite treatment system where solids are removed via clarification/filtration to prevent fouling of the treatment system.

Area A2

- A pilot study in this area showed that DPVE was an ineffective treatment due to the lack
 of identifiable contaminants observed in the extracted groundwater or soil vapors and the
 low hydraulic conductivity of the soil matrix. Therefore, institutional controls were
 implemented and the shallow groundwater in this area is extracted through conventional
 pumping for treatment by the onsite system.
- Implementation of institutional controls for the Yorktown aquifer as the plume is not expected to migrate offsite.

Area B

 Treatment of soil via hotspot removal and offsite disposal of the contaminated soil and debris.

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 Extraction and treatment of both the shallow and deep aquifer and implementation of institutional controls.

Construction of the groundwater extraction and treatment system was initiated in 1997 and continuous operation of the Camp Allen Treatment Plant began in November 1998. Figures 3-2 and 3-3 illustrate the layout of the system with associated shallow and deep monitoring well and surface water sampling locations. The DPVE system was completed and began operation in May 1998. Groundwater samples were collected from monitoring wells in March 1997 and June 1998 to provide baseline information on water quality before the extraction system was started. The extraction wells were sampled in August 1997 to provide information on water quality prior to system startup. Ecological sampling of surface water and sediment was performed in fall 1997.

3.1.2 Operation and Maintenance

The standard operation and maintenance of the DPVE and groundwater extraction treatment systems is documented in the Operations and Maintenance Manual for Soil and Groundwater Remedial Action (OHM Remediation Services Corp., August 1997). The operation of the groundwater extraction system was modified to include precipitation of dissolved inorganics in the groundwater to prevent fouling of the system.

3.1.3 Current Status

In accordance with the Decision Document, the Camp Allen Landfill is part of the LTM program at NSN. The long-term monitoring plan for the Camp Allen Landfill groundwater remediation system requires sampling of monitoring wells and surface water locations until action levels are met or until the concentrations of the contaminants of concern reach asymptotic levels. Four rounds of sampling were completed in May 1999, March 2000, March 2001, and March 2002. An aquifer pumping test study was conducted during summer 2000 and groundwater modeling was completed that fall to assess the extent of the capture zones for the individual extraction wells. A subgroup was developed to evaluate the overall effectiveness and potential for optimization of the groundwater remediation system at Camp Allen Landfill. In addition, the system operational data collected by Shaw Environmental and Infrastructure, Inc. are reviewed quarterly to assess the performance of the remediation system. The results of the monitoring are summarized in Section 5 of this report and documented in the *Final 2001 Annual Long Term Monitoring Report* (CH2M HILL, June 2002).

3.2 Site 2—NM Area Slag Pile

3.2.1 Remedy Selection and Implementation

The FS was submitted in 1998 (CH2M HILL, September 1998) and the PRAP was issued in 1999 (CH2M HILL, January 1999). The Remedial Action Design was completed in 1999 (CH2M HILL, September 1999). and the ROD (CH2M HILL, October 2000) was signed in December 2000. The purpose of the remedial action at the site was to control exposure to contamination present in the soil, groundwater, surface water, and sediment. The remedial action consisted of the following objectives:

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- Excavation and subsequent offsite disposal of contaminated sediment in the drainage channel adjacent to the site.
- Placement of an asphalt and soil cover to reduce exposure to site contaminants and provide for site reuse as a parking area.
- Stabilization of the bank of the drainage channel to prevent soil erosion from the slag pile into the drainage channel.
- Incorporation of land use controls prohibiting the excavation or disturbance of the site, the use of groundwater for drinking water, or disturbance of the monitoring system.
- Implementation of LTM annually for 5 years, and once every 5 years thereafter.

Approximately 1,600 tons of sediment were removed in November 1999 to achieve a lead cleanup goal of 218 mg/kg. The cleanup goal is based upon the Effects Range-Median (ERM) concentration for lead defined as the concentration of a contaminant in sediment at which adverse biological effects to living resources may be observed at a 50 percent rate. (Figure 3-4 illustrates the boundaries for the sediment removal action at the site.) Lead was found in all of the soil samples and is considered the indicator parameter for the COCs. Since it was co-located with the other COCs, the removal of lead to the established cleanup level was expected to remove the other elevated contaminants posing a risk.

The asphalt and soil cover was completed in February 2000. The cover consisted of a minimum of 2 inches of asphalt placed over the original gravel parking lot, and a minimum of 22 inches of soil cover (18 inches of soil plus 4 inches of topsoil) that was placed over the grassy field. The extent of the cover is shown in Figure 3-4. In addition, a 100-foot section of the west bank of the drainage channel was regraded, seeded, and covered with matting to prevent erosion of site materials.

3.2.2 Operation and Maintenance

Current site maintenance consists of periodically mowing the cover of the grass field.

3.2.3 Current Status

As a requirement of the ROD, the NM Slag Pile is part of the LTM program at NSN. Sediment, surface water, and groundwater samples are collected annually to monitor the levels of inorganics at the site and determine if these constituents are migrating offsite into the adjacent drainage channel. The sampling locations are shown on Figure 3-4. The first three rounds of sampling were completed in October 2000, May 2001, and June 2002 and are summarized in Section 5 of this report and documented in the *Final 2001 Annual Long Term Monitoring Report* (CH2M HILL, June 2002). Additionally, the grass at the site is maintained as a part of the NSN Grass Maintenance Contract.

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3.3 Site 3—Q Area Drum Storage

3.3.1 Remedy Selection and Implementation

In 1986, Navy fire inspectors expressed concern with the oil-saturated soils at the northern end of the storage area (previously used to store damaged or leaking drums). On the basis of a potential fire hazard, the top 6 inches of soil were excavated from an area of 4,240 square yards (totaling approximately 750 cubic yards of soil removed) in the northern section and disposed offsite in 1987 (Malcolm Pirnie, May 1988). Following the removal action, this area of the storage yard was paved. The extent of the soil removal is shown in Figure 3-5.

A DD (Environmental Science & Engineering, Inc., November 1996) for the site was signed in November 1996 to treat the groundwater and prevent offsite migration of the plume. The remedial action consisted of the installation of an air sparge (AS) and soil vapor extraction (SVE) system in AOC 1 and AOC 2. The system is comprised of 30 AS wells and 14 SVE wells in AOC 1 and 20 AS wells and 10 SVE wells in AOC 2. The layout of the treatment systems and associated monitoring wells for AOC 1 and AOC 2 are shown in Figures 3-6 and 3-7, respectively. The remediation system began operation in August 1998. Several monitoring wells were sampled for VOCs in February and May 1998 to provide baseline water-quality data before the remediation system was started. The established cleanup goals for the site are presented in Table 3-2.

3.3.2 Operation and Maintenance

The standard operation and maintenance of the air sparge/soil vapor extraction system is documented in the Environmental Facility User Manual for Groundwater Remediation (OHM Remediation Services Corp., August 1998). Based on the significant reduction of VOC concentrations during the first year of operation, the system operation was modified in September 1999. The SVE system was shut off and the operation of the AS system was altered to a 2-week cycle of pulsing.

3.3.3 Current Status

As a requirement of the Decision Document, the Q-Area is part of the LTM program at NSN. The monitoring plan currently includes the biannual sampling of 15 monitoring wells for VOCs and TPH. The first seven rounds of monitoring were completed in February and August 1999, March and August 2000, February and December 2001, and February 2002. A subgroup was developed to evaluate the overall effectiveness and potential for optimization of the groundwater remediation system at Q-Area. The system operational data collected by OHM and the monitoring data collected by CH2M HILL are reviewed by the subgroup quarterly so that the system operations and monitoring program can be promptly adjusted as necessary. The 2001 monitoring results are summarized in Section 5 of this report and documented in the *Final 2001 Annual Long Term Monitoring Report* (CH2M HILL, June 2002).

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3.4 Site 6—CD Landfill

3.4.1 Remedy Selection and Implementation

A Decision Document was issued for the sediments (OU 1) at the CD Landfill in October 1996. Its purpose was to reduce the risk to ecological receptors by removing sediments that exceeded the ERM levels. As shown in Figure 3-8, partial removal of the contaminated sediments was conducted in fall 1997. When the cap for the CD Landfill was designed, the cap was extended to cover the remaining sediments.

The PRAP (Baker Environmental, Inc., June 1998) and ROD (Baker Environmental, Inc., September 1998) for the CD Landfill were issued in 1998 to address soil and groundwater (OU2) at the site. The purpose of the remedial action was to reduce the hazards to human health and the environment by eliminating exposure to the soil and limiting the leaching of contaminants from the landfill into the groundwater. This was accomplished with a combination of a landfill cap, restricted access to the site, and institutional controls prohibiting access to the site and restricting future uses.

As outlined in the Landfill Closure Certification Report (CH2M HILL, August 2000), construction of the cap was initiated in May 1999 and completed in June 2000. The cap's extent is shown on Figure 3-8. Construction began with a final grading of the waste and installation of a 6-inch bedding layer to support the cover material. Following placement of the bedding layer, an impermeable barrier membrane was installed to prevent infiltration of water into the landfill material. A geocomposite drainage layer was also placed to provide adequate drainage of the cover and prevent water pressure from causing slope stability problems. The drainage layer is covered with a minimum of 24 inches of soil. This soil layer consists of 18 inches of onsite material overlain by 6 inches of topsoil to provide adequate nutrients to support the vegetation necessary to prevent erosion of the landfill cover.

3.4.2 Operation and Maintenance

Operations and maintenance at the site consists of periodic mowing of the vegetative cover as well as inspections of the landfill cover and institutional controls. The PWC conducts quarterly inspections and an outside contractor does so annually. The most recent inspection (July 2002) concluded that the remedy is protective of human health and the environment.

3.4.3 Current Status

As a requirement of the Virginia Solid Waste Management Regulations, Part D of 9 VAC 20-80-270, the CD Landfill is currently part of the LTM program at NSN. A total of three surface water locations and eight monitoring wells located upgradient, downgradient, and proximal to the site boundary (Figure 3-8) are monitored biannually to evaluate the effectiveness of the cover and determine if the landfill contaminants are migrating offsite. The initial 2 years of monitoring have been completed and are summarized in Section 5 of this report and documented in the *Annual Post-Closure Monitoring Report for 2001* (CH2M HILL, February 2002).

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3.5 Site 20—LP 20 Site

3.5.1 Remedy Selection and Implementation

The Decision Document (Baker Environmental, Inc., February 1996) for the LP-20 site required that contamination at the site be treated to reduce the threat to human health and the environment. As the site is highly industrialized, it is effectively capped by asphalt and concrete, eliminating direct exposure pathways. The goal of the remedial action was to treat the contaminant plume in the shallow aquifer using an air sparge/soil vapor extraction system to prevent migration of the plume offsite and into the deep aquifer, and reduce the contaminant concentrations to established cleanup goals. In addition, aquifer use restrictions (for both the shallow and deep aquifer) were mandated to prevent the use of the groundwater.

The construction of the treatment system was completed and began operating on April 14, 1998. The shallow aquifer is treated by an air sparging and soil vapor extraction system (Figure 3-9) consisting of 31 air injection wells and 21 vapor extraction wells. The system was placed throughout the center and downgradient extent of the contaminant plume. In addition, several monitoring wells were sampled for VOCs in February 1998 to provide baseline water-quality data before the remediation system was started. The groundwater cleanup goals were established based on risk exposure construction and utility workers who may be exposed to shallow groundwater. The cleanup goals are shown in Table 3-3.

3.5.2 Operation and Maintenance

The standard operation and maintenance of the air sparge/soil vapor extraction system are documented in the Environmental Facility User Manual for Groundwater Remediation (OHM Remediation Services Corp., March 1998). The operation of the AS/SVE system in Areas 1 and 2 was changed to a cycle of pulse pumping to increase the effectiveness of VOC removal.

3.5.3 Current Status

As a requirement of the Decision Document, the LP-20 site is part of the LTM program at NSN. Monitoring for LP-20 currently consists of an annual sampling of 15 wells in the shallow and deep aquifer to evaluate the levels of VOCs and determine if these constituents are migrating offsite or into the deep aquifer. The first five rounds of the monitoring program were completed in November 1998, May 1999, March 2000, April 2001, and February 2002. The monitoring results are summarized in Section 5 of this report and documented in the *Final 2001 Annual Long Term Monitoring Report* (CH2M HILL, June 2002).

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TABLE 3-1 Cleanup Goals Camp Allen Landfill Naval Station Norfolk

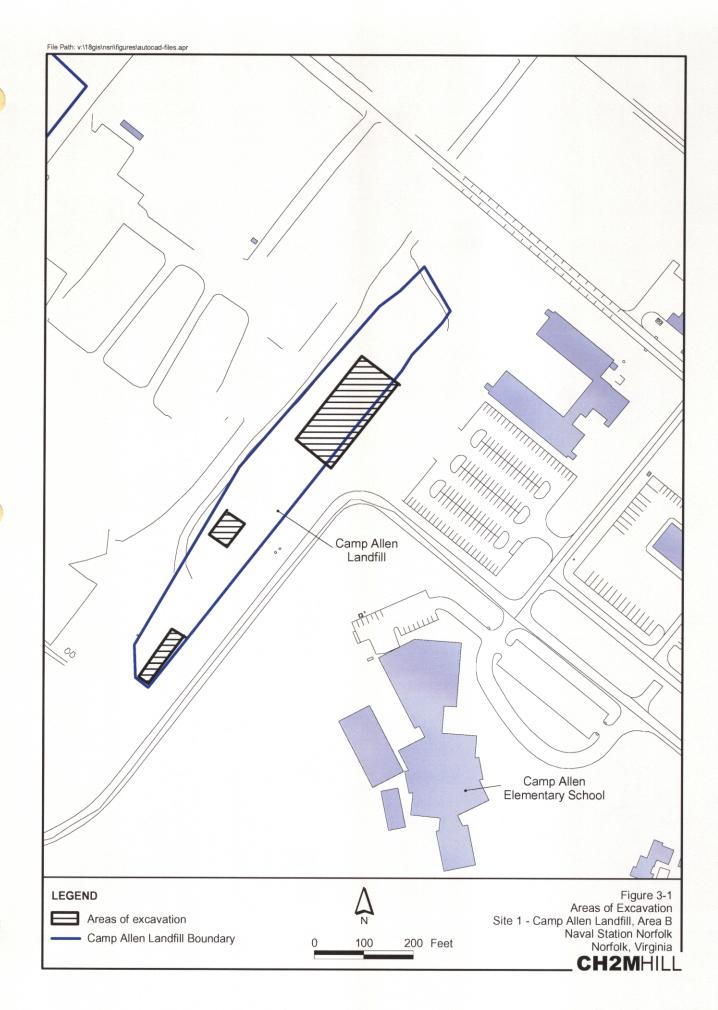
Contaminants of Concern	Deep Aquifer Cleanup Goals (ug/L)	Shallow Aquifer Cleanup Goals (ug/L)	Soil Cleanup Goals (mg/kg)
1,2-Dichloroethane	5	190	0.05
cis-1,2-dichloroethene	70	15,000	3.1
1,1,1-Trichloroethane	200	13,500	21.3
Benzene	5	600	0.2
Ethylbenzene	700	150,000	500
Tetrachloroethene	5	340	1.4
Toluene	1,000	301,000	220.7
Trichloroethene	5	1,600	0.5
Vinyl Chloride	2	9	0.01
Xylenes	10,000	3,000,000	7,000

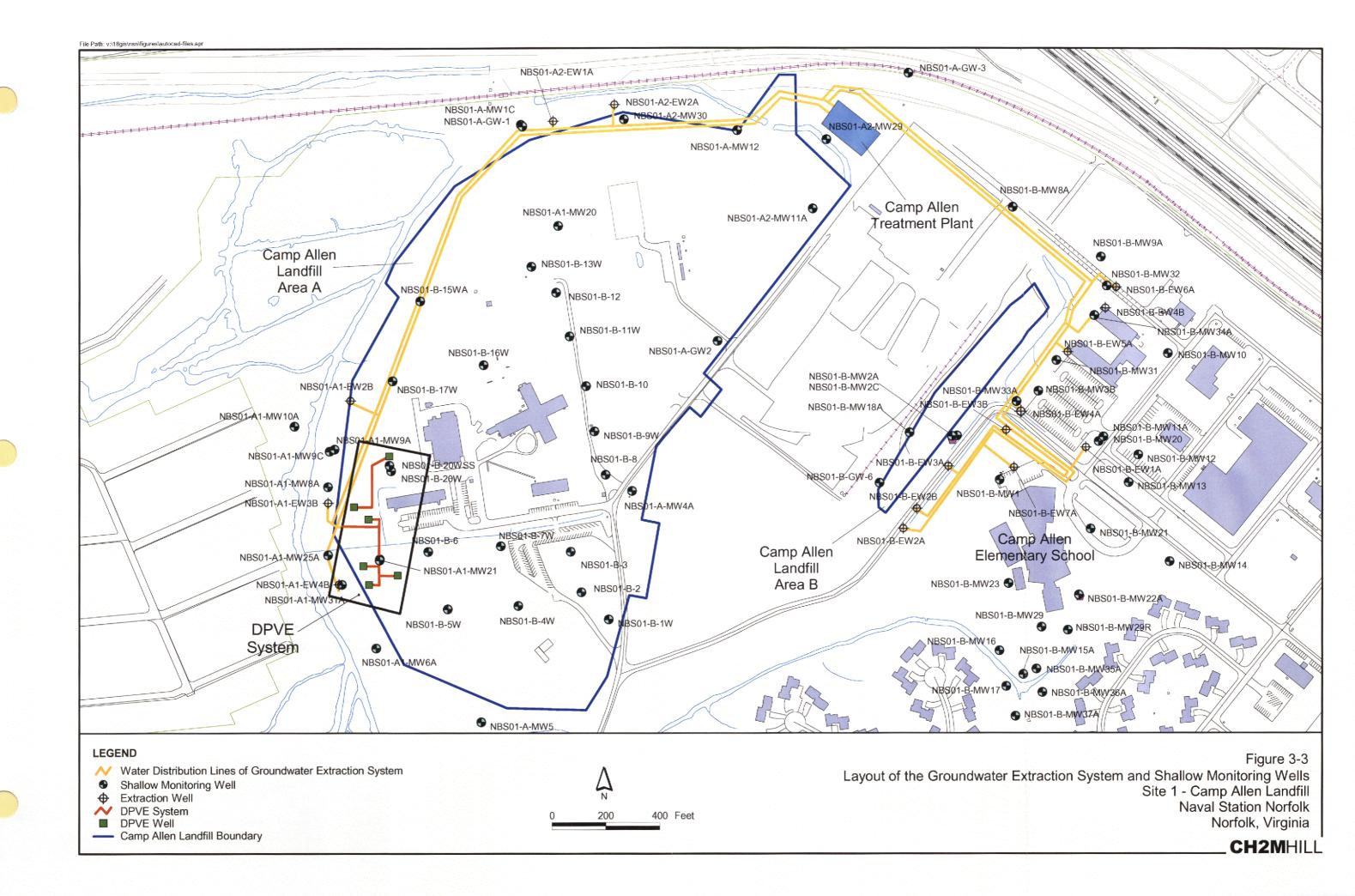
TABLE 3-2
Groundwater Cleanup Goals *Q Area Drum Storage Yard*Naval Station Norfolk

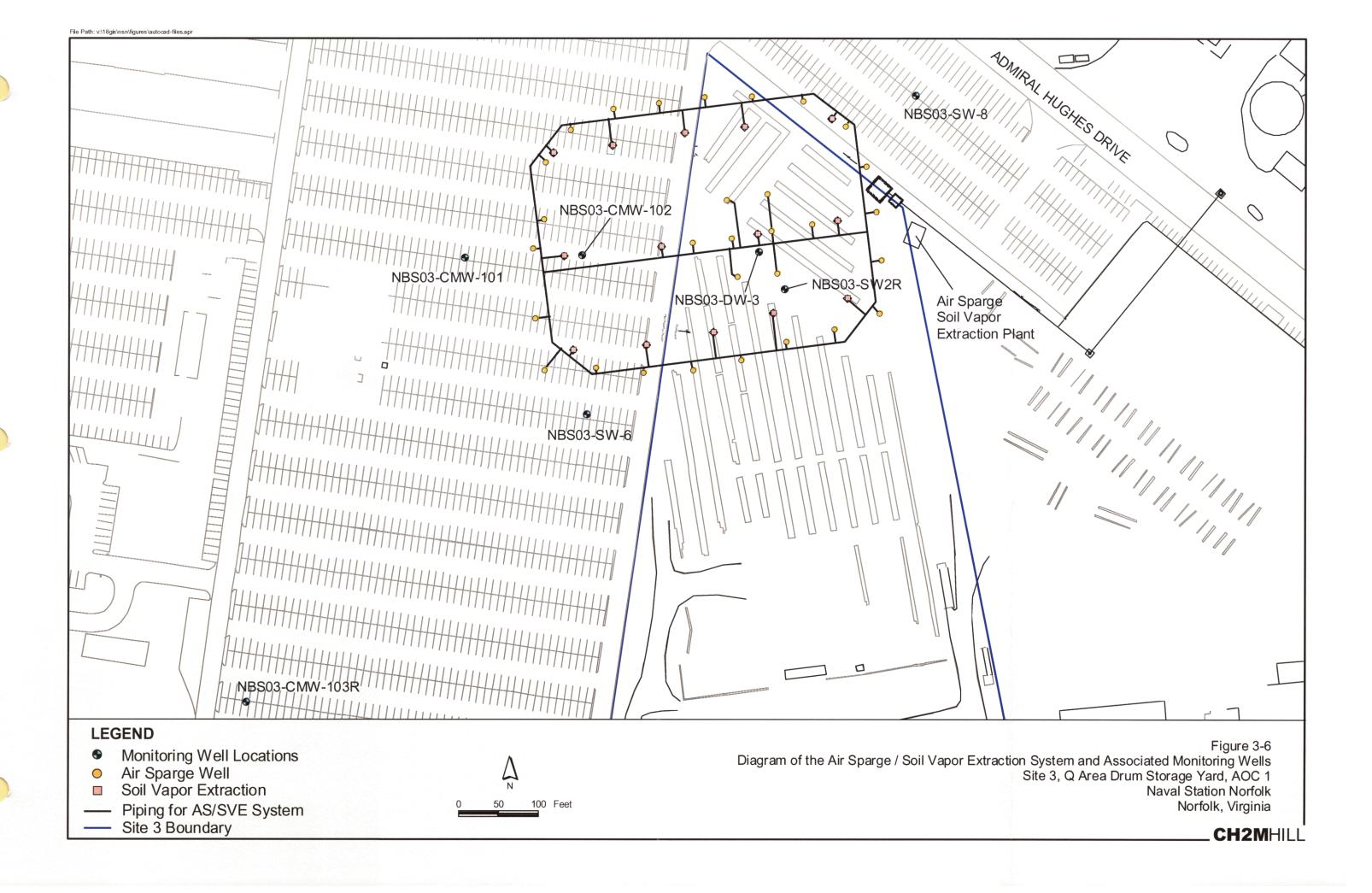
Contaminant of Concern	Cleanup Goal (ug/l) 1,000	
Total Petroleum Hydrocarbons		
Carbon Tetrachloride	3	
Chloroform	11	
1,1-Dichloroethene	0.38	
Tetrachloroethene	60	
Trichloroethene	49	
Vinyl chloride	<1	

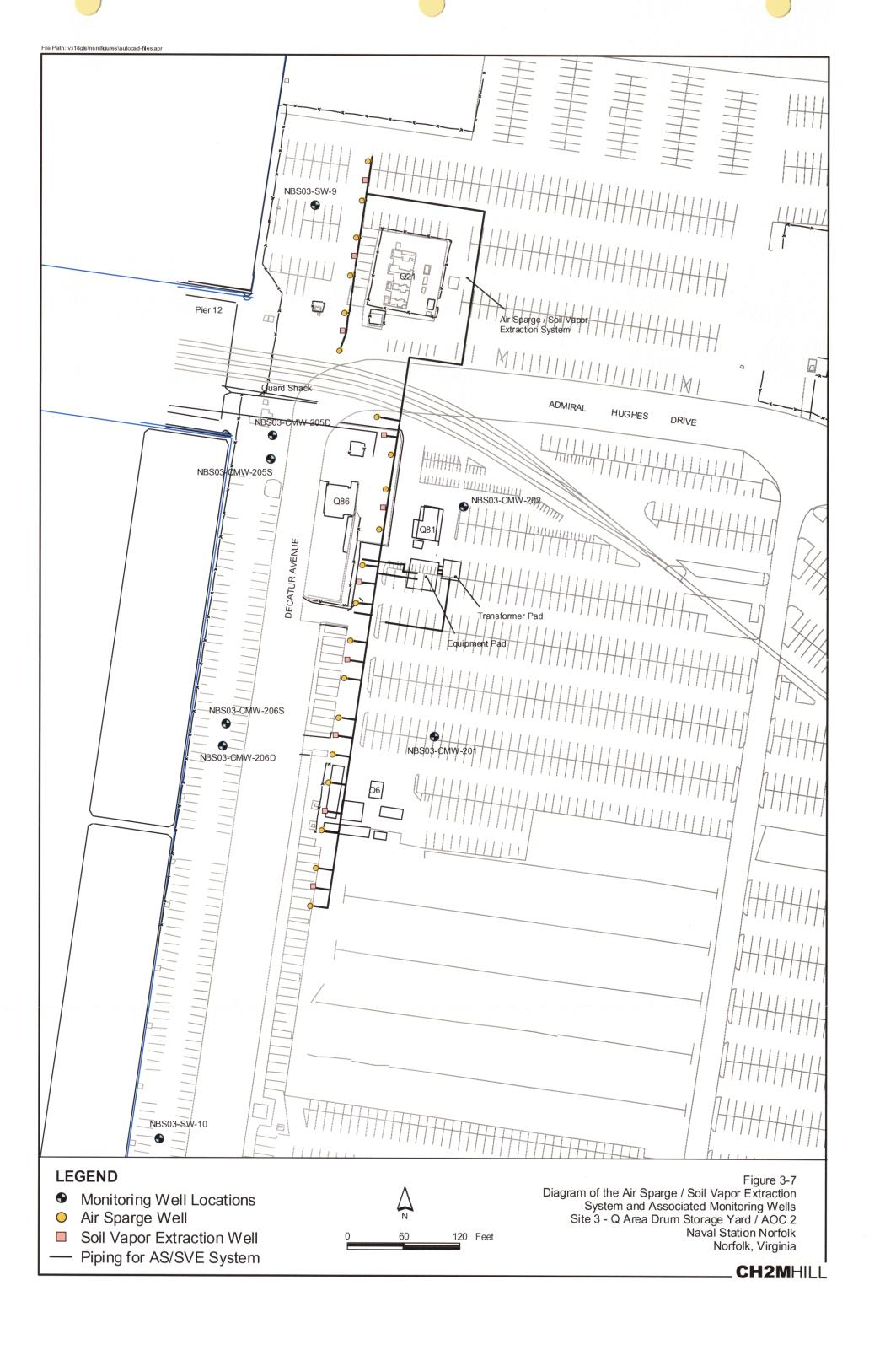
TABLE 3-3 Groundwater Cleanup Goals Building LP-20 Naval Station Norfolk

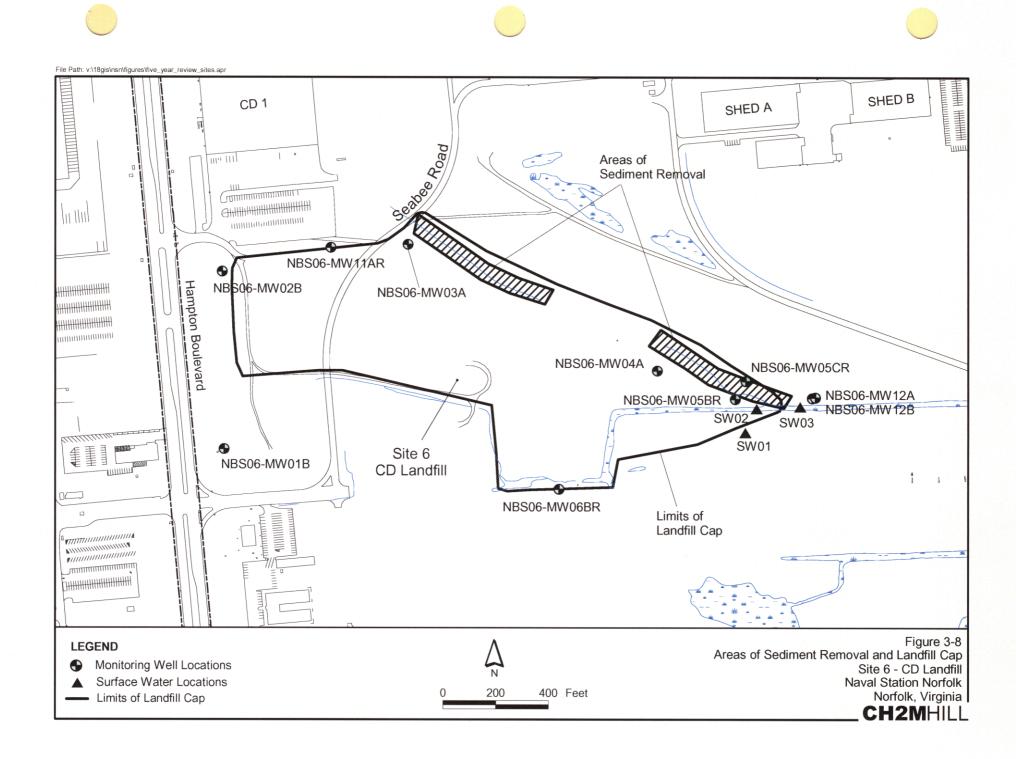
Contaminant of Concern	Risk-Based Cleanup Goal (ug/L)
Trichloroethene	136
1,1-Dichloroethene	11
1,2-Dichloroethane	172
1,2-Dichloroethene	306
Vinyl Chloride	6
Benzene	19











SECTION 4

Administrative Components of the Five-Year Review

The NSN Five-Year Review Team is led by Ms. Winoma Johnson, Navy technical representative for the Installation Restoration Program (IRP). The Team established the review schedule that began in July 2002 and extended through November 2002. The following activities were conducted as part of the Five-Year Review process:

- Community involvement
- Interviews
- Site inspections
- Applicable or Relevant and Appropriate Requirements (ARARs) review

4.1 Community Involvement

The community was informed of the initiation of the Five-Year Review through a RAB meeting in June 2002. The findings of the Five-Year Review were presented at the November 2002 RAB meeting. Additionally, community interviews were conducted as part of the Community Relations Plan update and the results incorporated into the Final Five-Year Review Report.

4.2 Interviews

Operations and maintenance of the treatment systems at CALF, Q-Area, and LP-20 are currently under contract with Shaw E & I, Inc. An interview was conducted with Shaw E & I site Superintendent Mark Pisarcik during the site inspections of July 29 and August 5, 2002. A summary of the interviews is presented in Appendix A and significant findings are discussed in Sections 5 and 6 of this report.

4.3 Site Inspection

An inspection of the Five-Year Review sites was conducted on July 29 and August 5, 2002. The inspection checklists are presented in Appendix B and significant findings are discussed in Sections 5 and 6 of this report. Photos of significant features at the sites are provided in Appendix C.

4.4 ARARs Review

As required by the NCP, selected remedies must be in compliance with all "applicable or relevant and appropriate requirements" (ARARs). ARARs are the cleanup standards, standards of control, and other substantive environmental requirements, criteria, or

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limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance of a Superfund site. The ARARs for the site are reviewed in this section per site.

4.4.1 Site 1—Camp Allen Landfill

The Decision Document (Baker Environmental, Inc., July 1995) details the cleanup goals for the soil and groundwater. The soil goals were established to be protective of groundwater from potential migration of VOCs from the soil. The soil goals were modeled to attain groundwater concentrations at the MCLs. Therefore, the soil goals remain protective of human health and the environment.

The cleanup goals for the Yorktown aquifer were based on MCLs. There have been no revisions to the MCLs for the constituents of concern at CAL; therefore, the cleanup goals established for the Yorktown aquifer remain protective of human health and the environment.

The cleanup goals for the shallow aquifer were established as risk-based goals that would result in an acceptable risk for non-potable groundwater use by a child during outdoor activities (lawn watering or car washing). Additionally, the shallow aquifer is not to be used as a potable supply based on a City of Norfolk ordinance prohibiting the use of the water table aquifer for public or private potable water supplies under Ordinance Chapter 46.1, Reference 46.1-5. The Ordinance requires that all potable water in the City of Norfolk come from the City's water supply system. Anyone violating the Ordinance will be guilty of a Class-1 misdemeanor. The groundwater beneath the site is not to be used as a potable supply based on the City of Norfolk ordinance and land use controls to be implemented by NSN.

4.4.2 Site 2—NM Area Slag Pile

The soil cleanup goal for lead at the Slag Pile site was based on ecological receptors. The goal is 218 mg/kg which is the ecological Effects Range—Median (ERM). This standard remains protective of both human health and the environment.

4.4.3 Site 3—Q Area Drum Storage

The Decision Document (Environmental Science & Engineering, Inc., November 1996) summarized the remedial action and goals for the groundwater and soil at the Q Area Drum Storage. The groundwater goals were established to be protective of the future worker from inhalation of indoor air that may contain volatile organics migrating from the groundwater. The risk-based groundwater remediation goals are more conservative than the MCLs for all constituents except tetrachloroethene and trichloroethene. However, given that the shallow groundwater is not to be used as a potable supply based on a City of Norfolk ordinance and land use controls to be implemented by NSN, the groundwater goals are still considered to be protective of human health.

A soil remediation goal was established for thallium, based on potential exposure to ecological receptors. However, the site is currently covered with an asphalt parking area. Based on the lack of complete exposure pathway to the ecological receptors, the soil goal is still considered to be protective of the environment.

4.4.4 Site 6—CD Landfill

The Record of Decision (Baker Environmental, Inc., September 1998) summarized the cleanup goals for the groundwater and surface water monitoring for 1,4-dichlorobenzene and chlorobenzene of 39 μ g/l and 0.44 μ g/l, respectively. These goals were established based on the USEPA Region III Risk-Based Concentrations (RBCs) for the protection of human health. The RBCs are based on a residential receptor using the water as a potable supply. Therefore, the performance standards remain protective of human health and the environment. Additionally, 1,4-dichlorobenzene and chlorobenzene were not detected in either the groundwater or surface water during the 2000 and 2001 monitoring events and subsequently, DEQ has approved exclusion of VOCs from the monitoring program.

Additionally, the groundwater monitoring program included the collection of groundwater quality parameters (hardness, TOC, TOX, specific conductivity, and pH) and groundwater contamination indicator parameters (chloride, total/dissolved iron, total/dissolved lead, and total/dissolved sodium) in accordance with DEQ Regulation 9VAC20-80-270 D5. The analytical data are evaluated using a trend analysis to determine if there are significant changes in the concentrations of constituents over time. The use of trend analysis is still a valid approach for evaluation to determine if there is an improvement in the groundwater quality following the installation of the cap.

4.4.5 Site 20—LP 20 Site

The Decision Document (Baker Environmental, Inc., February 1996) details the cleanup goals that were established for the shallow and Yorktown Aquifers beneath the Building LP-20 Site. The cleanup goals were developed to be protective of the construction worker/ utility worker non-potable exposure as the site is projected to be used for industrial purposes. The groundwater beneath the site is not to be used as a potable supply, given the City of Norfolk ordinance and land use controls to be implemented by NSN.

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Assessment

This section discusses the effectiveness of the remedial actions in achieving the goals established for each site.

5.1 Site 1—Camp Allen Landfill

5.1.1 Effectiveness of Remedy

Groundwater monitoring and flow modeling of the CALF were conducted to determine the effectiveness of the system in containing the VOC contaminant plume. The monitoring and modeling results are documented in the Annual Long-Term Monitoring report (CH2M HILL, June 2002). The report indicates that the groundwater remediation system has prevented the VOC plume from migrating towards the residential areas west and southeast of the site. The groundwater data from sentinel wells (wells located in the residential areas west of the landfill) have shown that contaminant levels remain below the MCLs. However, some monitoring wells located north of the site and outside of the extraction well capture zone demonstrated elevated levels of VOCs above the cleanup goals. Additional extraction wells are currently being installed to extend the capture zone to include this area.

5.1.2 Adequacy and Continued Needs for O&M

An inspection of the site conducted on July 29 and August 5, 2002 indicated that the treatment systems are in generally good condition and operating as designed. However, the shallow extraction wells in Area A (A2-EW1A and A2-EW2A) are not operating due to the low hydraulic conductivity of the shallow aquifer soils. In addition, deep extraction well A1-EW2B was damaged due to a collapse of the well casing and is currently not in operation. Furthermore, ferric chloride has been added to the treatment system to remove the solids from the groundwater to prevent them from fouling the system. Additional details are available in the interview and site inspection checklists in Appendixes A and B, respectively.

5.1.3 Achievement of Remedial Action Objectives/Cleanup Goals

Figures 5-1 and 5-2 show the locations of the monitoring wells that exceed the cleanup goals in the shallow and deep aquifer, respectively. The monitoring wells located in the shallow aquifer adjacent to the source area of the Area B landfill have shown a more than 50-percent reduction in VOC concentrations since the system's startup. The deep monitoring wells in Area B generally showed a trend of significant increase in VOC concentrations after the startup of the treatment system in 1998. However, this increase can be attributed to the downward vertical migration of the contaminants due to the greater hydraulic conductivity of the deep aquifer. The VOC concentrations in the deep monitoring wells have been reduced by more than 50 percent since the initial startup of the treatment system.

The shallow wells in the Area A landfill and the deep monitoring wells to the north of Area A have shown no significant decrease in the concentrations of the VOC constituents.

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However, the deep monitoring wells on the western border of the Area A landfill have demonstrated a decrease of greater than 50 percent in the VOC concentrations.

5.1.4 Opportunities for Optimization

The groundwater modeling showed that the VOC plume in the shallow and deep aquifers has been captured and has not migrated into the adjacent residential areas. The majority of the plume is contained by the deep extraction wells because of the significant interconnection between the deep and shallow aquifers. Options for optimization of the system as identified by the subgroup are currently being evaluated and include:

- Eliminate pumping from the shallow extraction well locations that do not contribute to the capture zone and have adjacent monitoring wells that meet the cleanup criteria.
- Consider increasing the pumping rates for Area B shallow extraction wells to enhance VOC mass reduction.
- Extend the capture zone for deep groundwater in Area A to contain the entire plume by modification of the existing extraction system.
- Determine minimum-pumping rates needed to maintain the capture zone in the deep aquifer to reduce downward vertical flow.
- Evaluate effectiveness of dual-phase system.
- Evaluate final monitoring requirements for containment and mass reduction in hot spots.

The specific steps to be implemented at CALF are described further in Sections 6 and 7. The system will continue to be evaluated by the subgroup for effectiveness and to identify any potential optimization strategies.

5.1.5 Changes in ARARs or Other Risk-Related Factors

There are no changes in the ARARs or other risk-related factors.

5.1.6 Changes in Known Contaminants, Sources, or Pathways at the Site

Two isolated locations with VOC concentrations above the cleanup criteria were observed in the recent rounds of monitoring data. One location is associated with well B-MW15A which is located to the south of Camp Allen Landfill Area B. The VOC concentrations in this location has not been exhibited in any of the wells located between Area B and this location; therefore, it is not certain if the VOC concentrations in B-MW15A is associated with Area B. The second location is associated with well B-20W located west of the brig and proximal to the DPVE system; however, is located within the Camp Allen Landfill Area A source area. These problems are currently being solved by the installation of additional extraction wells and modifications to the DPVE system. This is discussed in greater detail in Sections 6 and 7.

5.2 Site 2—NM Area Slag Pile

5.2.1 Effectiveness of Remedy

The combination of an asphalt and soil cover, as well as the implementation of institutional controls, effectively meets the remedial objectives to prevent exposure to soil, groundwater, surface water, and sediment.

5.2.2 Adequacy and Continued Needs for O&M

An inspection of the site conducted on July 29, 2002 indicated that the soil and vegetative cover, asphalt cover, and the bank of the drainage ditch are intact. Additional details are available in the site inspection checklist in Appendix B.

5.2.3 Achievement of Remedial Action Objectives/Cleanup Goals

A review of the latest data set (June 2002) indicates that the concentrations of inorganics in the groundwater, surface water, and sediment have not increased in comparison to the baseline concentrations established prior to the remedial action. In addition, the concentration of lead in the sediment remains below the cleanup goal.

5.2.4 Opportunities for Optimization

There are currently no opportunities for optimization. The monitoring program will be evaluated annually to identify alternatives to more cost effectively meet the monitoring objectives for the site.

5.2.5 Changes in ARARs or Other Risk-Related Factors

There are no changes in the ARARs or other risk-related factors.

5.2.6 Changes in Known Contaminants, Sources, or Pathways at the Site

There have been no changes in known contaminants, sources, or exposure pathways.

5.3 Site 3—Q Area Drum Storage

5.3.1 Effectiveness of Remedy

The treatment system has significantly reduced the concentrations of the COCs at the site and prevented further migration of the contaminant plume.

5.3.2 Adequacy and Continued Needs for O&M

An inspection of the site conducted on July 29, 2002 indicated that the air sparge system is operating and in good condition. Additional details are available in the interview and site inspection checklists in Appendices A and B, respectively.

5.3.3 Achievement of Remedial Action Objectives/Cleanup Goals

A review of the latest data from December 2001 and February 2002 shows that the cleanup goals have been achieved in AOC 1 for all COCs except for a vinyl chloride hotspot

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observed downgradient of the area. The analytical data from AOC 2 demonstrated a decrease or stabilization in the concentration of the majority of the COCs. However, the levels of trichloroethene and vinyl chloride remain above the cleanup goals. Figures 5-3 and 5-4 show the locations of the monitoring wells that exceed the cleanup goals at AOC 1 and AOC 2, respectively.

5.3.4 Opportunities for Optimization

The soil vapor extraction system has been shut down in both AOC 1 and AOC 2 because the vapor levels became too low for practical use of the system. The air sparge system at AOC 2 is in constant operation; however, the system at AOC 1 is pulse pumped monthly (2 weeks on, 2 weeks off). The treatment at AOC 1 was changed to a cycle of pulse pumping to increase the efficiency of the system when the levels of VOCs became asymptotic under constant operating conditions.

The monitoring data indicate that the cleanup goals for all contaminants in AOC 1 with the exception of vinyl chloride in three locations (CMW-101, CMW-103R, and SW-6), have been achieved. Therefore, the NSN Tier I Partnering Team joint scoped a closeout strategy for AOC 1 in July 2002. This is discussed in greater detail in Sections 6 and 7. The systems at both AOC 1 and AOC 2 will continue to be evaluated by the subgroup for effectiveness and to identify any potential optimization strategies.

5.3.5 Changes in ARARs or Other Risk-Related Factors

There are no changes in the ARARs or other risk-related factors.

5.3.6 Changes in Known Contaminants, Sources, or Pathways at the Site

There have been no changes in known contaminants, sources, or exposure pathways.

5.4 Site 6—CD Landfill

5.4.1 Effectiveness of Remedy

The combination of a landfill cover and institutional controls is effective in meeting the remedial objectives to prevent direct contact, inhalation, and ingestion of contaminated soil, groundwater, surface water, and sediment.

5.4.2 Adequacy and Continued Needs for O&M

The PWC conducts quarterly inspections and an outside contractor does so annually. The July 29, 2002 site inspection by identified some minor areas of erosion (opposite bank of drainage channel from the landfill) and sedimentation in the drainage pipes as minor maintenance issues at the CD Landfill. These issues are included in the site inspection checklist (Appendix B) and discussed in Sections 6 and 7.

5.4.3 Achievement of Remedial Action Objectives/Cleanup Goals

As a requirement of the Virginia Solid Waste Management Regulations, Part D of 9 VAC 20-80-270 the monitoring wells were sampled quarterly for Phase I groundwater contamination indicator parameters (specific conductivity, pH, total organic carbon, and total organic

halogens) during the initial 2 years of LTM. In addition, based upon previous investigations, the samples were also analyzed for selected metals (iron, lead, and sodium), chloride, and hardness. Surface water samples and samples from two downgradient wells were also analyzed for chlorobenzene and 1,4-dichlorobenzene. The results of the initial 2-year LTM indicated that the remedy has reduced the concentrations of selected VOCs in the groundwater and surface water to below the detection limits.

During the third year of LTM, Phase II sampling was added at the upgradient and downgradient monitoring wells. The Phase II sampling includes the analysis of an additional 15 metals and 47 VOCs. Once a sufficient amount of data have been generated, a trend analysis will be conducted to evaluate the migration of contaminants offsite.

5.4.4 Opportunities for Optimization

As a result of consistent non-detect levels of VOCs during the first year of LTM, sampling of surface water has been discontinued. Based on the trend analysis, the data will be evaluated to assess if the monitoring program can be reduced to monitor for contaminant indicator and groundwater quality parameters only (Phase I sampling).

5.4.5 Changes in ARARs or Other Risk-Related Factors

There are no changes in the ARARs or other risk-related factors.

5.4.6 Changes in Known Contaminants, Sources, or Pathways at the Site

There have been no changes in known contaminants, sources, or exposure pathways.

5.5 Site 20—LP 20 Site

5.5.1 Effectiveness of Remedy

The treatment system has significantly reduced the concentrations of VOCs at the site.

5.5.2 Adequacy and Continued Needs for O&M

An inspection of the site conducted on July 29, 2002 indicated that the treatment systems are in good condition and operating as designed. Additional details are available in the interview and site inspection checklists in Appendixes A and B, respectively.

5.5.3 Achievement of Remedial Action Objectives/Cleanup Goals

Overall, the concentrations of COCs have decreased from the baseline data. These reduced concentrations indicate that the AS/SVE system is effectively remediating the contaminant plume. However, an increase in some of the COCs (dichloroethene and vinyl chloride) above the cleanup goals was observed at certain wells. The increase in these constituents likely result from the degradation of VOCs at the site. Figure 5-5 shows the locations of the monitoring wells that exceed the cleanup criteria at the LP-20 site.

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5.5.4 Opportunities for Optimization

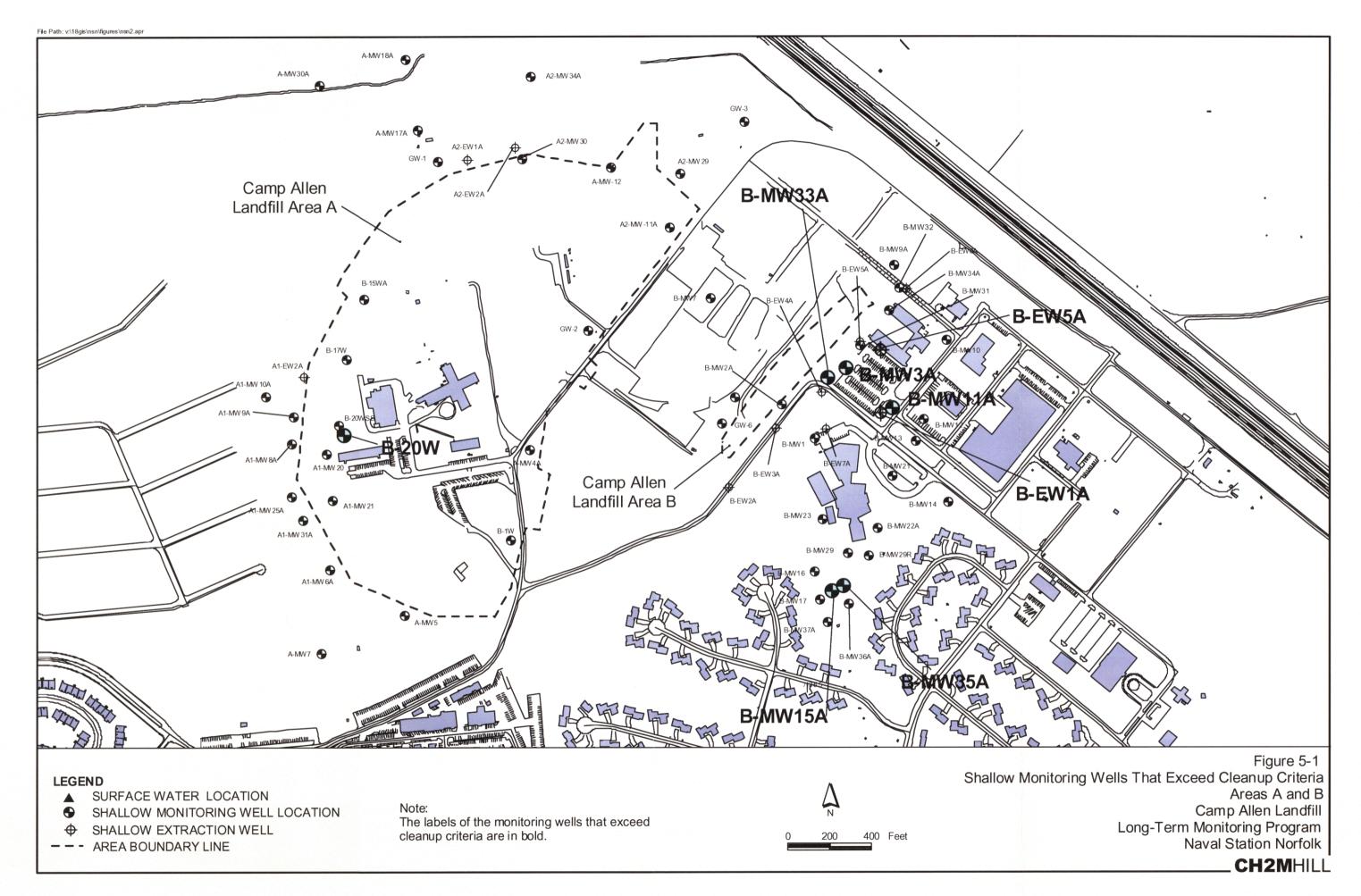
The AS/SVE system in Areas 1 and 2 was changed to a cycle of pulse pumping. The Areas are cycled 3 weeks on and 1 week off per month to increase the effectiveness of VOC removal. The AS/SVE system will continue to be evaluated by the subgroup for effectiveness and to identify any potential optimization strategies.

5.5.5 Changes in ARARs or Other Risk-Related Factors

There are no changes in the ARARs or other risk-related factors.

5.5.6 Changes in Known Contaminants, Sources, or Pathways at the Site

The concentrations of some VOCs have substantially increased in deep well MW97-2D, indicating some constituents may be migrating downgradient of the treatment system and into the Yorktown aquifer.



Remedy Issues

This section addresses potential issues observed during the site inspections or identified during a review of the analytical data.

6.1 Site 1—Camp Allen Landfill

Based on the review of the groundwater modeling and analytical data by the subgroup, the following issues have been identified:

- A localized area where VOC levels exceed the cleanup goals was observed in the shallow aquifer outside of the capture zone in Area B. The elevated concentrations are observed in monitoring wells B-MW15A and B-MW35A at the southeast of Area B. Although this location is contained by the capture zone of the deep aquifer, it is outside the influence of the shallow extraction wells. Extraction wells are currently being installed to extend the influence of the shallow system.
- A localized area where VOC levels exceed the cleanup goals was observed in the shallow aquifer at well B-20W located proximal to the DPVE system in Area A.
 Although this location is contained by the capture zone of the deep aquifer, it is outside the influence of the shallow extraction wells. The DPVE system is being evaluated and modified to extend the influence of the shallow system.
- Although the VOC plume in the deep aquifer is effectively contained from migrating towards the residential areas, the northern boundary of the plume has not been captured in Area A. Extraction wells are currently being installed to extend the influence of the deep system.

6.2 Site 2—NM Area Slag Pile

No concerns were identified with the remedy at the NM Area Slag Pile.

6.3 Site 3—Q-Area Drum Storage Yard

The majority of VOC concentrations have been reduced at AOC 1. However, as a result of the VOC degradation, concentrations of vinyl chloride have increased at locations downgradient of AOC 1. The subgroup has recommended a strategy to extend the AS system to the downgradient locations to accelerate the remediation.

In addition, several monitoring wells (SW-10, DW-6, SW-9, and DW-5) at AOC 2 were damaged during recent bulkhead construction activities.

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6.4 Site 6—CD Landfill

Several minor maintenance issues were noted during the January 2002 annual inspection of the CD Landfill as detailed in the Technical Memorandum (CH2M HILL, January 2002). The site was revisited on July 29, 2002 per the Five-Year Review requirement. Some of the concerns noted in the January inspection could not be verified in July due to heavy vegetative growth at the site. The issues from both inspections are summarized below:

- A portion of the north sideslope of the northernmost channel is steadily eroding, but the landfill cover system is not in jeopardy as the erosion is on the opposite side from the landfill.
- The fence along the eastern side of Seabee Road adjacent to the southern entrance gate is in need of repair. The poles are bent and the top railing is detached.
- There are eroded areas near the downstream ends of the 60- and 36-inch culverts.
- There is a small denuded patch of ground on the southeastern corner of the landfill.
- A number of the drainage net outlet pipes could not be located during the inspection and are likely covered by sediment.

6.5 Site 20—Building LP-20

The concentrations of VOCs have increased above the cleanup goals in deep monitoring well MW97-2D located approximately 200 feet east of the treatment system. The subgroup is currently evaluating the system to determine options.

Recommendations and Follow-up Actions

This section details recommendations for the deficiencies observed at the sites. Some of these recommendations are being implemented at the time of this report.

7.1 Site 1—Camp Allen Landfill

- The VOC concentrations exceeding the cleanup goals southeast of Area B are currently being addressed by the installation of an additional shallow extraction well in the area.
- Monitoring well B-20W (the location of the VOC exceeding the cleanup goals west of the brig) will be added to the annual LTM sampling. Though the monitoring well is near the existing DPVE system and contained by the extraction system, more localized groundwater remediation of this specific location is recommended. The feasibility of modifying the existing DPVE system to specifically remediate well B-20W is currently under consideration.
- In order to extend the capture zone of the deep aquifer to the northern section of Area A, an additional deep extraction well is currently being installed in the north adjacent to the existing shallow extraction well A2-EW1A.
- The shallow extraction wells in Area B will be evaluated to determine if the pumping rates can be raised to increase the mass removal rates of VOCs in this area.

7.2 Site 2—NM Area Slag Pile

No recommendations were identified for the remedy at the NM Area Slag Pile.

7.3 Site 3—Q Area Drum Storage Yard

The NSN Tier I Partnering Team joint-scoped a strategy in July 2002 to address the remaining vinyl chloride concentrations in AOC 1. The strategy includes extending the existing AS/SVE extraction system at AOC 1 to address this vinyl chloride area. The effectiveness of these alternatives will be evaluated by the subgroup on the basis of success in meeting the cleanup goals. Once the alternative has been implemented, biannual monitoring of the site will continue to track the effectiveness.

The damaged monitoring wells observed at AOC 2 should be repaired during the next drilling event at the Base.

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7.4 Site 6—CD Landfill

Proposed repairs for the maintenance issues are as follows:

- The denuded and eroded area noted in Section 6 should be repaired by regrading, seeding, and mulching.
- The fence at CD Landfill is damaged but the integrity is intact and it is not a security issue. Reattaching the top railing to the poles should repair the fenceline.
- The pipes covered by sedimentation may cause a problem if water cannot drain from the drainage net leading to saturated slopes and possible slope failure. It is not currently recommended that the pipes be uncovered as there are other visible drain outlets for water to exit the drainage net. However, the condition of the sideslopes should continue to be monitored and further action may be required if a problem arises.

7.5 Site 20—Building LP-20

The concentrations of VOCs in well MW97-2D should continue to be monitored. If the VOC concentrations continue to increase, localized alternative remedial options should be evaluated.

Protectiveness Statements

As part of the Five-Year Review for Naval Station Norfolk, a protectiveness statement must be developed for each of the sites.

8.1 Site 1—Camp Allen Landfill

The current operation of the groundwater extraction and treatment at Camp Allen Landfill was found to be protective of human health and the environment. The extraction system has prevented migration of the contaminant plume to residential areas west and southeast of the site. A subgroup has been developed to continually evaluate the remediation system's effectiveness and optimization. As a result of this evaluation, the treatment system is currently being expanded with the addition of new extraction wells to extend the capture zone to contain the plume north of the site.

8.2 Site 2—NM Area Slag Pile

The remedy for Site 2—NM Slag Pile is protective of human health and the environment under the current industrial land use.

8.3 Site 3—Q Area Drum Storage Yard

The current air sparge/soil vapor extraction (AS/SVE) system at the QADSY was found to be protective of human health and the environment. A subgroup has been developed to continually evaluate the effectiveness and optimization of the remediation system at the QADSY. The AS system in AOC 2 is operating and VOC mass continues to be removed from the groundwater at a significant rate. The remediation in AOC 1 has achieved the cleanup goals in those monitoring wells within the radius of influence of the AS system. However, a localized area downgradient of the system has demonstrated increases in the concentrations of VOC breakdown product-vinyl chloride. An enhancement of the remediation system is currently being considered in this localized area. The enhancement of the system is targeted for reduction in the vinyl chloride concentrations to achieve the acceptable levels such that the closeout strategy developed by the NSN Tier I Partnering Team can be achieved.

8.4 Site 6—CD Landfill

The current landfill cap and institutional controls at CD Landfill were found to be protective of human health and the environment. The PWC inspects the CD Landfill quarterly and an outside contractor does so annually. The 2002 annual inspection identified minor maintenance issues including small damage to fence, the erosion of a portion sideslope in drainage channel (opposite side of the landfill), erosion near the downstream ends of the

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culverts, and potential sedimentation of drainage net outlet pipes. The maintenance issues will be addressed to prevent potential problems from arising. Even with the minor maintenance issues, the landfill cap and institutional controls remain protective.

In addition, once adequate LTM sampling is conducted, a trend analysis will be conducted to determine constituent migration patterns.

8.5 Site 20—Building LP-20

The current AS/SVE system at Building LP-20 was found to be protective of human health and the environment. The system has been effective in reducing the VOC concentrations within the contaminant plume. Additional evaluation will be completed to determine if the system is operating effectively and if there is potential for optimization.

SECTION 9

Next Review

The completion of the next Five-Year Review for Naval Station Norfolk is required by November 2007, 5 years from the completion of this review.

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Appendix A Interview Summary

Interview Summary

Personnel Interviewed:

Mark Pisarcik, Superintendent, Shaw E & I, Inc.

Interviewer:

Ben Francisco/CH2M HILL, Paul Landin/CH2M HILL

Date:

July 29, 2002

Location:

Camp Allen Treatment Plant

1. Have there been any alterations to the groundwater treatment and extraction system from the original design?

Ferric chloride has been added to the system to precipitate out metals in the groundwater.

2. Is the treatment system functioning as designed?

The shallow extraction wells in Area A (A2-EW1A and A2-EW2A) are not operating due to the low hydraulic conductivity of the soils. Deep extraction well A1-EW2B was damaged due to collapse of the well casing and is currently not in operation.

Personnel Interviewed:

Mark Pisarcik, Superintendent, Shaw E & I, Inc.

Interviewer:

Ben Francisco/CH2M HILL, Paul Landin/CH2M HILL

Date:

July 29, 2002

Location:

Q-Area

1. Have there been any alterations to the groundwater treatment and extraction system from the original design?

The SVE system has been turned off in both AOC 1 and AOC 2 because the vapor readings became too low for practical use of the system. Operations of the AS system in AOC 1 are cycled (2 weeks on, 2 weeks off).

2. Is the treatment system functioning as designed?

With the exception of the changes noted, the treatment system is functioning as designed.

Personnel Interviewed:

Mark Pisarcik, Superintendent, Shaw E & I, Inc.

Interviewer:

Ben Francisco/CH2M HILL, Paul Landin/CH2M HILL

Date:

July 29, 2002

Location:

LP-20

1. Have there been any alterations to the groundwater treatment and extraction system from the original design?

The system in Areas 1 and 2 is cycled 3 weeks on and 1 week off per month.

2. Is the treatment system functioning as designed?

With the exception of the changes noted, the treatment system is functioning as designed.

Personnel Interviewed:

Mark Pisarcik, Superintendent, Shaw E & I, Inc.

Interviewer:

Ben Francisco/CH2M HILL, Paul Landin/CH2M HILL

Date:

August 5, 2002

Location:

Camp Allen DPVE System

1. Have there been any alterations to the groundwater treatment and extraction system from the original design?

No.

2. Is the treatment system functioning as designed?

Yes.

Appendix B Site Inspection Checklists

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

L SITE IN	ORMATION
Site name: CAMP AUDN CANDALL	Date of inspection: 7-19-62
Location and Region: NSN: NO RFOULVA	CLAS
Agency, office, or company leading the five-year review: CH2M HIU- NAVY LLEGAL	Weather/temperatures
Remedy Includes: (Check all that apply) Landfill cover/containment Access controls Institutional controls Groundwater pump and treatment Surface water collection and treatment Other	Monitored natural attribute from Granubzater containment Vertical barner walls
Affactiments: Inspection team roster attached	Site map attached
II. INTERVIEWS	(Cleck all that upply)
1. O&M site manager MAKK PISANCIV Name Interviewed at sits at office by phone Ph Problems, suggestions: Report attacked	
2. OdeM staff MAQUE OSAULIU Name Interviewed (active) at office by place Pi Problems, suggestions; Report attached	Title Date

A 22 Test 1 1 2 7 1 2 1	Agency				
Contact	Name Problems; suggestions; Report attached		Title	Date	Phone no.
	AIRECANAIS, A				
Agency_	Agency				Teka
	Name suggestions; 1	Report attached	Title	Date	Phone no
Agency Contact	Name		Title	Date	Phone no
Problems;	suggestions;	Report attached			
Agency Contact				4.00 a. <u></u>	******************************
Salar and Aller Al	Name suggestions:	Report attached	Title	Date	Phone no
Other int	es views (option	al) Report at	ich 4		
				Commence of the second section of the	
- marin Unit		1963.3. s. jeda. 2003.2. s. jeda.			
	the state of the s				M

•	O&M Documents			
	O&M manual	"Readily available	Up to date	NA
	As-built drawings	Readily available	Up to date	NA
	Maintenance logs Remarks	Readily available	p to date علا	NVA
e.	Site-Specific Health and Safety Plan	eRéadily available		NA
	Contingency plan/emergency response plan Remarks	nn —Kcadily available	*Up to date.	NA
Park 181 Color	O&M and OSHA Training Records	Readily available	√Up to date	
	Remarks	Caus Avanant	чу воже	N/A
Constr (enitorio (h	Permits and Service Agreements			
TA.	Air discharge permit	Readily available	Up to date	NA
	Effluent discharge	Readily available	Up to date	NA
	Waste disposal, POTW	Readily available	Up to date	NA
	Other pennits	Readily available	Up to date	NA
	- 大学の大学学者は、主義は多様は、東京は、アスケット、東京のお主義、「「」、「日本の名		A Orto	Acres de la companya
		which colors		
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<u></u>	Pedico 177 City Files Gas Generation Records Read	en Prejs sobin	S NON-HAR	
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	Gas Generation Records Reading Remarks Settlement Monument Records Remarks Groundwater Monitoring Records Remarks NAVY CLEPN Leachate Extraction Records	Exa Pt : 1 106 1 m Readily available Readily available	date N/A Up to date	dv.+n.scn
	Gas Generation Records Read Remarks Settlement Monument Records Remarks Groundwater Monitoring Records Remarks NAVY CLEAN	Readily available Readily available Readily available	date N/A Up to date Up to date	dv.tngen
	Gas Generation Records Remarks Settlement Monument Records Remarks Groundwater Moniforing Records Remarks Leachate Extraction Records Remarks Discharge Compliance Records	Readily available Readily available Readily available Readily available	date N/A Up to date Up to date	Av-trosen
	Gas Generation Records Remarks Settlement Monument Records Remarks Groundwater Monitoring Records Remarks Leachate Extraction Records Remarks Discharge Compliance Records Air	Readily available Readily available Readily available Readily available Readily available	date N/A Up to date Up to date Up to date	WATER OF THE PARTY
	Gas Generation Records Remarks Settlement Monument Records Remarks Groundwater Moniforing Records Remarks Leachate Extraction Records Remarks Discharge Compliance Records	Readily available Readily available Readily available Readily available	date N/A Up to date Up to date	Av-trosen
	Gas Generation Records Remarks Settlement Monument Records Remarks Groundwater Monitoring Records Remarks Leachate Extraction Records Remarks Discharge Compliance Records Air Water (efficient)	Readily available Readily available Readily available Readily available Readily available	date N/A Up to date Up to date Up to date	WATER OF THE PARTY

	<u>, , , , , , , , , , , , , , , , , , , </u>	<u> </u>	v. O&M Costs	
	O&M Organization State in-house PRP in-house Pederal Facility in-hi Other	(Contractor for State Contractor for PRP Contractor for Pederal	Facility
	O&M Cost Records Readily available Funding mechanism Original O&M cost est	Up to dat agreement in pl mate_	aca	akdown stracked
	10	tal annual cost l	y year for review per	iod if available
	Prom To		i di 4 <u>Pan aga sela</u>	Breakdown attached
	Date From To	Date	Total cost	Breakdown attached
	Date	Date	Total cost	Breakdown attached
	From To_	Date	Total cost	• Commence and the second of t
	From To_	Date	Total tost	Breakdown attached
	From To_		Total cost	Breakdown attached
•	Date	Date		
-	Unanticipated or Um Describe costs and rea	usually High O sous:	&M Costs During R	eview Period Land Cart
التا				
	V. ACCESS	and institu	TIONAL CONTRO	DES CONTROL NA
L B	HOS made produces.			
	Fencing damaged Remarks C. 1714	Fru - 6	n shown on sie map MRESTRUCTU A MARKETS	Gibbs second MD CO 1-610055 ANEA B. 0.161-72
в. С	Mier Access Restriction			
1.	Signs and other seco	ulfy measures	Walker S	WA

	Implementation and enforcement							
	Site conditions imply ICs no	cement	in in it		والمستنسدال			
	Site conditions imply ICs no	t property implemen	30001 		Tes	No No	NA	
	The state of the s	s near min curer	74		1 63	TAĐ	NA	
	Type of monitoring (e.g., sei	f-reporting, drive b	u) Si	W MON	Toll	NL	and the second second	
	Frequency / //////		Wall. N					
	Responsible party/agency	WAVY LLE	-עמ	CHIMH)	£3-			
	Responsible party/agency NAVY CITHY-CHLM HM2 Contact Ben Fronusco PROJ Man 7-29-44 940 37							
	Name		Title		Date		Phone no.	
	Reporting is up to date	<u>a Die Grade a Ner</u>		en filosoficial de la companya de l La companya de la co	Yes	No	NA	
	Reports are verified by the l	cad agency		u Te	cres	No	NA	
	Specific requirements in der	معمودی <u>معرف مدون سوانی</u>	حيه نددن		***	312	10.000	
	Violations have been report	ri vivi ocrzechi docivi		.e एकमा प्राद्ध	Yes	No	NA.	
	Other problems or suggestic	os: Reportat	eratual		Yes	No	NA	
	Anne Indonessa or subBeatto	us, reputa	1112			8.1		
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	Remades	Open adoquate		ICs sire inadeq	wate		NA	
i c		(Oşm adaquatı		ICs are inseen	uate		NA.	
	Remarks							
	Remarks Peacral Vandalism/trespassing	Location shown o				3/13-13		
	Remarks					3/10-10-10-10-10-10-10-10-10-10-10-10-10-1		
	Remarks Vandallism/tv-spassing Remarks	Location shown o				**************************************		
4	Remarks Vandalism/respassing Remarks Land use changes on site	Location shown o						
4	Remarks Vandallism/tv-spassing Remarks	Location shown o						
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	Vandalism/irespassing Remarks Land use changes on site Remarks Land use changes off site Remarks	Location shown o						

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17	Remarks		
	VIL LA	NDFILL COVERS Applicable	@
Lar	idfill Surface		
	Settlement (Low spots) Areal extent Remarks	Location shown on site map Depth	Settlement not evident
. T	Cracks Lengths Wi	Locatica shown on site map idths Depths	Cracking not evident
	Krosion Areal extent Remarks	Location shown on site map Depth	Erosion not evident
-	Holes Areal extent Remarks	Location shown on site map Depth	Holes not evident
1 5.	Vegetative Cover Trees/Shubs (indicate siz Remarks	Grass Cover properly established locations on a disagram)	ished No signs of
	Alternative Cover (armore Remarks		
	Dules Areal extent	Location diown on did map	Bulges not evident

8.	Wef Areas/Water Damag Wet areas Ponding Seeps Soft subgrade Remarks	Wet areas/water damage not Location shown on site map Location shown on site map Location shown on site map Location shown on site map	Areal extent Areal extent Areal extent
9.	Slope Instability S Areal extent Remarks	Slides Location shown on site map	No evidence of slope instability
B B	enches Applie (Horizontally constructed a in order to alow down the channel.)	cable OB- mounds of earth placed across a steep lan velocity of surface runoff and intercept s	ndfill side alope to interrupt the slope and convey the runoff to a lined
i.	Flows Bypast Bench Remarks	Location shown on site map	NA or okay
2.	Bench Breathed Remarks	Location shown on site map	N/A or okay
3.	Bench Overlopped Remarks	Location shown on site map	N/A or okay
C: 1	etdown Channels Appli (Channel lined with erosion side slope of the cover and landfill cover without creat	n control mats, ripsap, grout bags, or ga I will allow the nunoff water collected by	bions that descend down the steep , the benches to move off of the
1.	Settlement Areal extent Remarks	Depth	No evidence of settlement
2	Minterial Degradation Minterial type Remarks	Location shown on site map Areal conen	No evidence of degradation
3.	Erosion Areal extent Remarks	Location shown on life map Depth	No cridence of croston

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<u>,</u>	Undercutting Location shown Areal extent Depth Remarks	on site map No evidence of undercutting
	Obstructions Type Location shown on site map Size Remarks	No obstructions Areal extent
	Excessive Vegetative Growth No evidence of excessive growth Vegetation in channels does not obstruct f Location shown on site map Remarks	low Acad category
D. C	over Penetrations Applicable (NO)	
	Gas Vents Active Properly secured/locked Punctioning Byldence of leakage at penetration N/A Remarks	Passive Routinely sampled Good condition Needs Maintenance
2	Gas Monitoring Probes Properly secured/locked Functioning Bydence of leakage at persuation Remarks	Routinely sampled Good condition Needs Maintenance IVA
	Monitoring Wells (within surface area of l Properly secured/locked Punctioning Bysteme of leakage at penetration Remarks	andful): Routinely tampled Good condition Needs Maintenance N/A
	Leachafe Extraction Wells Properly scenared/locked Punctioning Byidence of leakage at penetration Remarks	Routisely sampled Good condition Nicos Maintenance NA
3.	Settlement Monuments Loc Registes	Routinely surveyed NVA

E, C	s Collection and Treatment	Applicable	€VA)		
	Gas Treatment Facilities Flaving Good condition Remarks	Thermal destruction Needs Maintenance	Collection for reuse		
2	Gas Collection Wells, Mar Good condition Remarks	ilfölds aud Piping Noods Maintenaus			
	Gas Monitoring Facilities Good condition Remarks	(e.g., gas monitoring of a Needs Maintenance	ijacené homes or building N/A		2 Table .
P. C	ver Drainage Layer	Applicable	(V)		
1.	Outlet Pipes Inspected Remarks	Experience -	×	*	
2.	Outlet Rock Inspected Remarks	Procientog	N/A		
G, D	etention/Sedimentation Pond	s Aprile Me			
	Siltation Areal extent Siltation not evident Remarks	Depth		N/A	
2	Erosion Areal exi Brosson not evident: Remarks	D			
3	Onlie Works Remarks	Precions NA			
4.		Proctioning WA		2000 - Xiv 101	

L Re	taining Walls	Applicable	CADA	
	Deformations Horizontal displacement Rotational displacement Remarks		n on site map Vertical displac	Deformation not evident
<u>.</u>	Degradation Remarks	Location show	n on site map	Dégradation not evident
L Pe	rimeter Ditches/Off-Site I)scharge	Applicable	(ED)
1.	Silfation Los Areal extent Remarks	ation shown on site Depth	mag Sillation	i mit evident
2.	Vegetative Growth Vegetation does not: Areal extent Remarks	impede flow	wa in site map	
3.	Erosion Arcal extent Remarks	Location sho Depth	yar os sile map	Brosion not evidens
4.	Discharge Structure Remarks	Punctioning	W.	
	VII V	ertical barr	er Walls	Applicable (IVA)
i.	Sottlement Areal extent Respets		own on site map	- Settlement pot evident
2	Performance Monito Performance not m Prequency Head differential	conjured		Sylvence of Greaching

	IX. GROUNDWATER/SURFACE WATER REMEDIES APPLICATION NA	1.00
A. Gr	oundwater Extraction Wells, Pumps, and Pipelines Opplicable N/A	
	Pumps, Wellhead Plumbing, and Electrical GOS Condition Exercised Required wells properly operating Needs Maintenance N/ Remarks Penns ON A17 STICIPATE CVALASIVICY OFF EXACT OF CENSY GOVE WEEK ASSIVICETIONS	\ <u>L</u> 1200
2 .	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances Conficientialo: Needs Maintenances Remarks	
3	Spare Parts and Equipment Kindly available Good condition Requires upgrade Needs to be provided. Remarks	
B. Su	urface Water Collection Structures; Pumps, and Pipplines Applicable	
	Collection Structures, Pumps, and Electrical Good condition Nocds Maintenance Remades	
2.	Surface Water Collection System Pipelines, Valves, Valve Roxes, and Other Appurtenance Good condition Neods Maintenance Remarks	
	Spare Parts and Equipment Resulty available Good condition Requires upgrade Needs to be provided Remarks	

C. Treatment System	(Applicable)	N/A		
-Metals remove All stripping	Lens	ale: separation m adsorbers	Bioremediation.	urings Village Significant Sig
Additive (e.g. Others Sozza Good condition Sampling por Sampling/ma Equipment pr Quantity of g	on Need to properly marked and function interaction of the control	s Maintenance stional up to date	ite Malt Filoy A ARINIMA, MITEM P 63009000 Bellyr	
NOT EX	CONTURNISHE			-
Electrical Enel N/A Remarks	osures and Panels (proper Cood conditions	y rated and functional Needs Maintenan		
Tanks, Vaults, NA Rematks	Storage Vessels Good condition	Proper secondary	containment Needs Maintes	
N/A	Cool condition	Meds Maintener	AIR J /AIFIUS	
5. Treatment Bu NA Classicals a Remarks	iliding(s) Cood condition (esp. and equipment properly store		Next rpsi	
Properly so All required Remarks F	Veils (print) and treatment of cured/locked Geneticaling wells located Name of the Control of th	Rousinely sample of Maintenance INTENANCE	id Good condition NA JEST LAZERAS (CM)	
D;-Monitoring-Data				
I. Monitoring P.	nts fouringly submitted on time	k of specific	ble quality	
2. Monitoring d	ata unggests: ter plume is effectively cont	sinci Contambra	t corcentations as declaring	

Moi	
	Monitoring Wells (natural attenuation remedy) Properly secured/locked Functioning Routinely sampled Good condition All required wells located Needs Maintenance N/A Remarks VOCS ONLY TANNON DASK PUS
T State	× other reveals
the	there are remedies applied at the site which are not covered above, attach an inspection sheet describing a physical nature and condition of any facility associated with the remedy. An example would be soil por extraction.
	XI. OVERALL OBSERVATIONS
	Implementation of the Remedy
	designed. Begin with a brief studement of what the remedy is to accomplish (i.e., to contain contaminate plane, minimize infiltration and gas emission, etc.). SYSTEM IS OPERATIMA AS DESIGNEY TO EXTRACT 4
**************************************	TREAT VOC: IN GROUDDWATER AT THE THE METALS TREATMENT ADDED TO PREVENT FOULING
- Montana	
	METALS TREATMENT RODED TO PREVENT FALLING
A CAMPAGE AND A	METALIC TREATMENT RODED TO PREVENT FOULING. Adequacy of O&M Describe issues and observations related to the implementation and copy of O&M procedures. In particular, discuss their classociation to the conventional long term provestiveness of the energy. ACCURATION OF THE PROPERTY OF THE COMMENT OF THE PROPERTY OF THE COMMENT OF THE

c.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future: METALS TREATERSON AND FOR SHAVON ABUTECH OF CACUAGE VALUE WITH FERRILL CHUO PUDE
	AREA A SHALLOW EXTRACTION WINGS NOT EUNCHIDNING DUE TO LOW HYDRAMIC LONDUCTIVITY OF SOM. DEEP MWIDI NOT EUNCHIONING DUE TO COLLARSE OF WOLL CASING
D.	Opperionities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. SEE 5-YR REVIEW TEXT FOR SUGGESTED MODIFICATIONS/CHANGES
*	

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

	DRMATION
Site name: CAMP ALLEV LF — DOYE (1996	Date of inspection: 8/5/02
Location and Region: MAYLL STATION WORFELD	
Agency, office, or company leading the five-year review:	Weather/temperature: 80 % SUNNY HOT HUM ID
Institutional controls Croundwater pump and treatment Surface water collection and treatment Other	Monitored natural attenuation Groundwater containment Vertical banier walls
Attachments: Inspection team roster attached	Site map attached
	Site map attached (Check all fint apply)
	(Check all that apply) Cuper in Fendon + 8/5/0/2 Title Date
II. INTERVIEWS 1. O&M site manager MARK PISARCIAL Name Interviewed Marke at office by phone Place	(Check all this apply) Copic is lead of Date Copic is lead of State Copic is leaded of State Title Date

OSWER No. 9355.7-03B-P

Agency			
Contact Name Name Problems, suggestions; Report att	Title	Date	Phone no.
Agency			(18 m) (1 <u>7) (18 m) 448</u>
Name Problems; suggestions; Report at	ritie schoil -	Date	Phone no
Agency Contact			
Name Problems; suggestions; Report at	Title	Date	Phone ne
Agency			
Name Problems; suggestions; Report of	Title	Date	Phone ac
Other interviews (optional) Re	presentation of the second		

	O&M Documents		e de la companya de	
	O&M manual	Readily available	Up to date	NA
	As-built drawings	*Keadily available	*Up to date	NA
	Maintenance logs	-Keadily available	-Up to date	N/A
	Remarks (C-67 A.7 A	and treame	WT PLAN	7
	Site-Specific Health and Safety Plan		TO to date	NA
	Contingency plantemergency response	nse plan Readily available	*Op to date	NA F
E Vis Windin	Remarks KEPT AT MAI	in Chief Allen	-FYER ME	
	O&M and OSHA Training Records	• Keadily available	Up to date	NA
	Remarks KEPT AT MAIN	I CAMP ALLEN	TREATMEN	7
	Permits and Service Agreements			
	Air discharge permit	Readily available	Up to date	WA?
	Effluent dischargs	Readily available	Up to date	WA
	Waste disposal, POTW	Readily available	Up to date	W.
	Other permits	Readily svallable	Up to date	(NA
	Remarks			
	Gas Generation Records	Readily available Up t	o diate NA)
142.3	Remails			
·t.				
	Settlement Monument Records	Resolity systlable	Up to date	ja)
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	Settlement Monument Records Remarks Groundwater Monitoring Records Remarks //AV/ LEA/V Leachate Extraction Records Remarks Discharge Compliance Records Ais Water (effluent)	Restly systable Restly systable Restly systable	Usada. Uriodae	NYA.

in Hari				1	v. O&M COSTS	96 1949 <u>- 1940 - Janes James Janes Ja</u>	
	PRP i	n-house n-house al Facilit			Contractor for State Contractor for PRP Contractor for Federal	l Petity	
		ly avails ng mech	ble misova	Up to dat greenent in p	lace		3 1
	CALEBRA	Octor C				설명하면 생생하면 함께 생각하는 사람이 되어 있다. 그는 것이다. 그리고 있다면 생각을 보고 있는 것이 되는 생각이다.	د پ
		, Prej Hariya da	To	al a ngital cost i	by year for review per	Breakdown attached	
	From	Date	To	Date	Total cost	Breakdown attached	
	From_	Date	To	Date Date	Total cost	Breakdown attached	
	From_	Date	_То	Date:	Total cost	Breakdown attached	
s" k iloet	From_	Date	_To_	Dis	Total cost	Breakdown attached	
	Vasati Descrit	elpated & costs :	or Upw	mally High C	&M Costs During P	Koview Period	
		V. AC	CERA Y	MD INSTIT	UTIONAL CONTRI	DLS Applicable NA	
• 7	enclog	*					
	Fends Remai	g dame ca	ged ** •	locate -	n shown on sie map		
3	ilior Acce	s Restr	ictions				
5 U	The Carlot of th	ngang in mangal padagalan	VICE COLUMN		1000		- mai

ı.	Implementation and enfor	cement					
	Site conditions imply ICs no		nezted		Yes	4	WA
	Site conditions imply ICs no	t being fully enfo	noed		Yes	Ø	NA
	Type of monitoring (e.g., se Frequency ANNOB					1102	ાયું ક
	Responsible party/agency_	NAVY CL	<u> 2911 - CH</u>	<u> 2m HILL, </u>			<i>ii</i>
	Contact REN FRANCIS		Title	@I	\$^-5-€		(d-813)
	Name of the second		LING		Date		Phone no.
	Reporting is up-to-date				16.	No	NA
	Reports are verified by the l	ead agency			76	No	NA
			iga. Garaga da sa	er Miller (gr. 18 mai 18 de de de de de de	FORMULA POTENTIAL	#101955 1202 #101955	विकास - 1 - 2007
	Specific requirements in de		aments have b	een met	Yes	No	NA
Artista	Violations have been report				Yes	No.	NĄ
	Other problems or suggesti	na: vehou	attached				
				en en en en en en		-	
——							
2.	Adequacy Remarks	(K) are adequa	ic <u>(C</u>	s ice inadeq	sale		iva .
2.		(C) nre adequa	6	s áre inadequ	sale		WA
2.		(C) suc adequa	ie IC	s ate inacieq			iva.
	Romatio	Ks are adopted	C C	te hadeq			IVA.
D. G	Remarks						
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D. G	Remarks						
1	Remarks Venteral Vanishing/responsing						
D. G	Remarks Vandellistoficespassing Remarks Land use changes on title	Location show					
1	Remarks Vandalitas/Arcspassing Remark	Location show					
1.	Remarks Vandellistoficespassing Remarks Land use changes on title	Location show					
	Vandalikss/trespassing Remark Land see changes on site Remark	Location show					
D-G	Remarks Vandellistoficespassing Remarks Land use changes on title	Location show					
	Content Vandelites/freespassing Remain Land use changes on the Remain Land use changes of the	Location show					
	Content Vandelites/freespassing Remain Land use changes on the Remain Land use changes of the	Location show					
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	Content Vandelites/freespassing Remain Land use changes on the Remain Land use changes of the	Location show					

	Remarks	
at.		
13	VIIV) PA	NDFILL COVERS Applicable (NA)
	Milit Sprice	
2		
	Settlement (Low spots) Areal extent	Location shown on site map Settlement not evident Depth
	Para la companya da l	
	6,23	Location shown on site map Cracking not evident
		idtis Deptis
	Remarks	
ığı		
	Exosion	Location shown on site map Brosion not evident
	Arcal calculation	Depth
		Location shown on site map Holes not evident
		Depth
	Remarks	
cen		Gibb Coys apposity established No signs of say
	Vertileter	Gian Cover properly established No signs of sure and locations on a diagram)
	Remarks	
4.5	Alternative Cover (armore	is rick concrete, etc.) NA
4	Reinide	
1	Bulges Area extent	Location shown on site map Bulges not evident Hatiglit

	Wet Areas/Water Damage Wet areas Ponding Seeps Soft subgrade Remarks	Wet areas/water damage not e Location shown on site map Location shown on site map Location shown on site map Location shown on site map	evident Areal extent Areal extent Areal extent Areal extent Areal extent
9.	Slope Instability Slic Areal extent Remarks	les Location shown on site map	No evidence of slope instability
B. B.		ble (WA) yeards of earth placed across a steep lan locity of surface runoff and intercept ar	
L	Flows Bypass Beach Remails	Location shown on site map.	NA or day
2	Beach Breached Remarks	Location shown on site map	N/A or olasy
3.	Beach Overtopped R-matt	Location shown on site map	N/A oc disty
	etilown Channels Applica (Channel lined with exoden side slope of the cover and y landful cover without exasti	control mats, rijesp, grout bags, or gab will allow the muoff water collected by	ions that descend down the steep die benches to move off of the
	Scittement. Areal extent Remarks	Location shown on site map i N Depth	io evidence of settlement
	kfésériék Dig adados Makinat type Romati	Location shows on allo may Application Fig. 18 and 18 an	G evidence of departments
ļ.,			

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4.	Undercutting Location shown on site ma Areal extent Depth Remarks	p No evidence of undercutting
	Obstructions Type Location shown on site map Areal (Size Ronalities	
	Excessive Vegetative Growth Type No evidence of excessive growth Vegetation in channels does not obstruct flow Location shown on site map Areal Remarks	caten -
D. C	over Penetrations Applicable (NA)	
	Gas Vents Active Presive Properly secured/locked Functioning Routine Byldence of leakage at penetration N/A Remarks	ly sampled Good condition Needs Maintenance
	Gas Monattering Probes Properly secured/locked Punctioning Routing Dyadence of leakage at penetration Ramanics	cly sampled Cood condition Needs Maintenance N/A
	Monitoring Wells (within statice area of landfill) Properly secured/locked Practicaling Routin Bysteince of leakage at percustion. Remarks	cir sampled Good condition Neets Maintenance NVA
	Leachais Extraction Wells Properly second/locked Practioning Routin Byldenes of leakage at pensioning Remarks	sely simpled. Good condition Needs Maintenance. NA
. B		

Dist.

E. Gı	s Collection and Treatment	expelicable N	(A	
		la A <i>la</i> intersera	ollection for reuse ASTION COURT PHASE	
	Gas Collection Wells, Manifolds *Stand candidor: New Remarks:	and Piping Is Maintenaice		
	Gas Monitoring Facilities (e.g.,) Good condition Nee Remarks	gas moniforing of seljace de Maintenauce	sat homes or buildings)	
F. C	ver Drahese, Eye	Applicable:	102	
L,	Outlet Pipes Inspected Remailes	Parisons,		
2.	Outlet Rock Inspected Remarks	Punctioning	N A	
G' b	efeation/Sedimentation Fonds	Applicable		
L.	Silvation Areal extent Silvation not evident Remarks			: B
	Erosion Aceal extent Busion not evident Remarks			
3.	Outlet Wods Remark	eloing WA		
	Dant Ri Remarks	etioning MA Sur The John Company of Comment		

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L R	etaining Walls	Applicable (N/A)	384 144 144 144 144 144 144 144 144 144 1
	Deformations Horizontal displacement Rotational displacement Remarks	Location slows on site map Vertical displace	Defirmation not crident ment
2 ,	Degradation Remake	Location shown on site map	Digradation not evident
L Pe	rimeter Diiches/Off-Site Di	scharge Applicable	
1.	Siliation Loca Areal exemt Remarks	tion shown on site map. Silenton Dépth	Werden
2	Vegetative Growth Vegetation does not in Areal extent Remarks	Location shows on site map specie flow Type	
3.	Erision Archi carrit Remark	Location shows on site may Depth	Actorio evidens
4.	Discharge Structure Remarky	Processors NA	
\$1	VJU-XYR	etical barrier Walls	Applicate CND
	Selfement Areal extent Remote	Location shows on the may	Saltenear rox coddeas
	Performance Monitor Performance not mot Progressy Head differential Remarks	demed **	

IX. GROUNDWATERSURFACE WATER REMEDIES Applicable N/A
undwater Extraction Wells, Pumps, and Pipelines Applicable IVA
Pumps, Wellhead Plumbing, and Electrical Confoundation All required wells properly operating. Needs Maintenance. IVA Remarks
Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances Good condition Needs Maintenance Remarks Con BC (CD) BM AVMC - W/LL BE RETURNED
Space Parts and Equipment (Readly available) Good condition Requires appears Needs to be provided. Remarks
face Water Collection Structures, Pomps, and Pipelines Applicable (NA) .
Collection Structures; Pumps, and Riccircal Good condition Needs Maintenance Remarks
Starface Water Collection System Pipelines, Valves, Valve Bexes, and Other Appartenances Good condition Needs Maintenance Remarks
Spare Parts and Equipment Restily available Good condition Requires upgrade Needs to be provided Remarks

l Tre	eatment System	Applicable	N /A		沙使杂型从下。
3 F	Treatment Train (Ch Mends removal Air stripping Filters	Oil/wa	pply) der separation n adsorbers	Biocene	(Extion)
		tion agent, flocculent)			
	Good condition Sampling ports prop Sampling/maintena Equipment properly Quantity of ground	erly marked and func- nce log displayed and i	u to date		
2	Electrical Enclosure NA Remarks	sand Panels (properly soid condition)	rated and function Needs Mainten		
3.	Tanks, Vaults, Store	ge Versels fool condition	Proper seconds		Needs Maintenance
4 °		and Appeirtenances lood condition	Needs Mainter		
5		ional condition (esp. n) Neods.	ensir.
6	Mosiloring Wells (Properly accured/ All required wells Remarks	nump and treatment re ocked Punctioning located Neo	necty) Routinety san le Maintenance	pled Cook	ondition NA
D, M	Ionioring Data				
1,	Monttoring Data	ely sylpmittéd on time	Loface	ptable quality	
2.	Monitoring data sug	NOTE THE PROPERTY OF THE PARTY.	ined Cheduni	sen concentations	acedealinius

D. Mo	ultored Natural Affenuation
	Monitoring Wells (natural attenuation remedy) Properly secund/locked Functioning Routinely sampled Good condition All required wells located Needs Maintenance N/A Remarks
effectivis Sirie ve	X.OTHERREMEDIS
앱	There are remedies applied at the site which are not covered above, attach an inspection about describing is physical nature and condition of any facility associated with the remedy. An example would be soil apor extraction:
	XL OVERALL OBSERVATIONS
A.	Implementation of the Remedy
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant phone, infiltration and gas emission, etc.). THE DUAL-PHASE VAPONE EXTENCTION SYSTEM IS INTENDED TO EXTENDED BY THE LIBUTO AND VAPONE CONSTITUENTS AT THE SITE. THE SYSTEM IS FUNCTIONING AS DESCRIBED AND ALTERNATING CYCLES.
B.	Adequises at O&M
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. O.B.M. APPCAYLS APPROVATES TO MOST THE CHECKY & LOUIS STREETINEMESS OF THE CAMPBOX THE COMMENS OF THE CAMPBOX THE

Early Indicators of Polential Remedy Problems
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the fature. - COMMUNICATION PLANE AT SCIRACTION - LOUST - CURLENTLY HAVE PARTS ORDER
· No ether problems Noted
Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
- 보통 - 보통 - 보통 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

L SITE IŅ	PORMATION
Site name: NM SLAG PILE	Date of Inspections 7-29-02
Location and Region: NSN NORFOCK, VA	RVID
Agency, office, or company leading the five-year review: CHIM HW NAIY CLEAN	Weather/temperature: 908 SUMMY HOT HUM118
Remedy Includes: (Check all that apply) Landfill cover/containment Access controls Institutional controls Groundwater pump and treatment Surface water collection and treatment Other	Monitored natural attenuation Groundwater containment Vertical barrier walls
Attachments: Inspection team roster attached	Site askip attriched
IL INTERVIEW	(Cleck all tiss apply)
1. O&M site manager V/R Name Interviewed at site at office by plione Pla Problems, suggestions; Report attached	Tile Date
2. CAM staff Name Interviewed at site at office by plione Ph Problems, suggestions, Report attached	

OSWER No. 9355.7-038-P

Agency			1	
Contact Nan Problems; suggestions		704	Date	Phons to,
Agency Contact				
Nan Problems; suggestion		760\$	Date	Phone no
AgencyContact				
Nat	ne s; Report attached			Plicie no
Agency				
Na Problems; suggestion		Tič		Phone no
Other later views (o	pina) Repotatide			

	O&M Documents			
ř.	O&M manual	Readily available	Up to date	LIVA
	As-built drawings	Readily available	Up to date	HVA
	Maintenance logs	Readily available	Up to date	NA
	Remarks			
	Site-Specific Health and Safety Plan	Readily available	Up to date	SWA
** ****	Contingency plan/emergency response plan	Readily available	Up to date	AWA
	Remarks			
	O&M and OSHA Training Records	Readily available		-WA
k an mak	Remarks Record		Up to date	TVA
	Permits and Service Agreements			
F857	Air discharge permit	Readily available	Up to date	CHÍ
	Rffluent discharge	Readily available	Up to date	MOA
ř.	Wasto disposal, POTW	Readily available	Up to date	WA
	Other permits	Readily available	Up to date	LIVA
	Remarks			
		available Up to	dato N/A	•
14.	Gas Generation Records Readily	available Up to	date N/A	
	Gas Generation Records Readily Remarks Settlement Monument Records Remarks Groundwater Monitoring Response			
	Gas Generation Records Readily Remarks Settlement Monument Records Remarks Groundwater Monitoring Records	Readily available (Cadly available	Up to date	***
	Gas Generation Records Readily Remarks Settlement Monument Records Remarks Groundwater Monitoring Records Remarks MAY LLAC CL	Readily available (Readily available)	Up to date Up to date	WA NA
	Gas Generation Records Remarks Settlement Monument Records Remarks Groundwater Monitoring Records Remarks Leachate Extraction Records Remarks Discharge Compliance Records Ait	Readily available Readily available Readily available Readily available	Up to date Up to date Up to date Up to date	N/A CNA
	Gas Generation Records Remarks Settlement Monument Records Remarks Groundwater Monitoring Repords Remarks Leachate Extraction Records Remarks Discharge Compliance Records	Readily available Readily available	Up to date Up to date Up to date	N/A N/A
	Gas Generation Records Remarks Settlement Monument Records Remarks Groundwater Monitoring Records Remarks Leachate Extraction Records Remarks Discharge Compliance Records Air Water (efflueis)	Readily available Readily available Readily available Readily available	Up to date Up to date Up to date Up to date	WA NA CNA

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	Other_/	nouse Rouse Pacility in-ho	100e O 187 — A-SI	ominactor for State contractor for PRP contractor for Pederal PHALI COLE () OF PE	Facility 12_BANKING 2_NONTHERN C	(S) Kriss App
	Funding	eyailablo	Up to date agreement in pla mate			
vá.	Lingt	10	al annual cost by	year for review paid	od if available	
	Firem	Total			Breakdown attached	
	Ð	ale:	Date	Total cost	Breskdown strucked	
	From	To ate	Date	Total cost		
	From D	To_	Date	Total cost	Breakdown attached	
	From	To_	Date		Breakdown attached	
	From D	ate To	Date	Total cost	Breakdown attached	
		late .	Date	Total cost		
- 4						
	Describe e	des and reas		M Costs During Re		
			(ND INSTITU	HONAL CONTRO	18 Applicable (N/A	
			urran (m)	IIONAL-CONTRO	is Applicate (174	
The state of the s				HOWAL CONTRO	13 Applicable	
	ictor	lamaged	Location			

I.	Implementation and enforcement Site conditions imply ICs not properly implemented Site conditions imply ICs not being fully enforced	Yes	No No	N/A N/A
	Type of monitoring (e.g., self-reporting, drive by) Gnarrow. Frequency Arrow(t)	Ansa_ /	MAN	HORAK (
	Responsible party/agency A/AVY CLETY CHILM Contact SEN FRANCISCO PROTECTION Name Title		<u> </u>	160 3734 Phone no.
	Reporting is up-to-date Reports are verified by the lead agency	66	No No	NA NA
	Specific requirements in deed or decision documents have been met Violations have been reported Other problems or suggestions: Report attached	Yes Yes	No No	ØØÆ NVA
2.	Adequacy (C) ife adequate ICs are inade	equate		N/A
	Remarks	equate:		WA
	Repairs	equate		
n ç	Remarks constant And all saverpassing Location shown on six map			
ric	Consist And Alisavire passing Location shown on six map Remarks Location shown on six map Remarks Location shown on six map Remarks			
	Caterial VandallishVrepassing Locaton slown on sie men Remeris Lind use changer on sie Remarks Lang use change of siz			

	Renet	
	YIL LAND	FILL COVERS (Applicably N/A
		CAP (SOUTH) I'SAL CONOR NOTEL
	Settlement (Low spots) Areal catege Remarks	Location shown on site map Settlement not evidence. Depth.
	Cracks Lengths Width Remarks	Location shown on site map Questing not evident Depths
	Erosion Areal count Remarks	Location shown on site map
		Location shows on site map. Holes not exident: Depth
20	Des Siring (nations size a	uss Cover properly established No signs of stores and locations on a diagram) LIVE OF The Special Lad Gages SHAPE ANGELY POSETION GOES SHAPE BY SECTIONS.
	Alternative Cover (ermores)	
	Balaes	Location shows on the map Source and system. Helpin

SOUTHERST EVENER OF ERASS VOR SAMOSE - ESTIMATE
25 (N-5') X 50'(E-W) BUT NO SIGN OF EXOSIONAL
GULLIES OR PONDING
D-12

	Wet Areas/Water Dam: Wet areas	ige	Wet areas/water damage Location shown on site in	nap Areal ex	dest
	Ponding		Location shown on site n		
	Sceps		Location shown on site n		L. C. Land
	Soft subgrade Remarks		Location shown on site n	tap Arcal é	((-it
	Slepe Instability Areal carriers Remarks	Slides	Location shown on site of	usp (No evid	ence of slope instability
	(Horizontally constructed		Fearth placed scross a steep sarface runoff and interes		
	Flows Bypass Beach Remarks NACY BY CORNER OF	2000 2000 2000	Location shown on site n (S. S. M. A. J. P. M. Aut. To Direct S	AUI MOWA	NA grokey 1 IN SE U To Storen Drenkt
2.	Beach Breached Remarks	Local	on shown on site map	€	or oldy
3	Beach Overtopped Remarks		Location shows on site r		N/A-cola)
	Remarks Adown Channels (Channel line)	والد الأبه ألم	N/A mais, riprap, great bags, or m the namoff water collectes		social down the steep
	Remarks Addown Channels: App. (Channel lined with every side alone of the caver a		N/A mats, ripcap, grout bags, or or the turnoff water collecter on gullies.)		scend down the steep to move off of the
C L	Remarks Addown Channels (Ep) (Channel lined wift cross side slope of the cover a landfull cover without co Settlement. Areal extent	ibin centy od will allo eating cos Local	N/A imais, rippap, grout bags, or ny dis manoff water collecter (on guillies.)	gabions that de I by the bunches Log Evidence	scend down the steep to move off of the

4.	Undercutting Location shown on site map No evidence of undercutting Areal extent Depth Remarks
	Obstructions Type Location shown on site map Areal cycles Size Remarks
6	Excessive Vegetative Growth No criticate of excessive guerth Vegetation in chainfuls does not obstruct flow Location shown on site map Areal excent Remarks 1 (2) (2007) (1009) (1000)
D. C	over Penetrations (Applicable) IVA
	Gas Vents Active Passive Properly secured/locked Functioning Routinely sampled Good condition Hydence of leakage at penetration Needs Maintenance NA Remarks
	Case Mentioring Probes Properly secular Access Functioning Rosable sample). Good agriction Twittens of Scalings at personal Needle Maintenance (NA) Remarks At Accident Function Function WE CAN TELL FUNCTION APPLICATION
	Monitorine Wells (within number area of landful) Expectly accused/forliest Agentonities Agentonities (Scool condition) Evidence of leakage at prostation (Neock Maintenance NA) Remodes
	Leachaté Edit action Wells Propody scorred/locked Practicology Routinely, sampled Cond condition Evidence of leakage at penetration Neody Manufactures Remarks
5	Settlement Monuments Located Roundly preceyed (Remarks

E.	Gas Collection and Treatment	Applicable	
1.	Gas Treatment Facilities Flaring Good condition Remarks	Thermal destriction Needs Maintenance	Collection for reuse
2 .	Gas Collection Wells, Man Good condition Remarks	uffolds and Piping Needs Maintenance	
3.	Gas Monitoring Facilities Good condition Remarks	(e.g., gas monitoring of Needs Maintenance	Edjacent homer or buildings)
F.	Cover Drainage Layer	Applicable	600
1.	Outlet Pipes Inspected Remarks		
2.	Outlet Rock Inspected Remarks	Punchaning	NA
G.	Detention/Sedimentation Pond	E Applicable	
I.	Silitation Areal extent Silitation not evident Remarks		
2	Erosion Agest est Brosson not evident Remarks		
3.	Outle Works - Remarks	Psyclicalis, NA	
4.	Dom. Ren ets	Punctioning IVA	

. Re	staining Walls	Applicable	(MV)	
	Deformations Horizontal displacement, Rotational displacement Remarks		vn on site map Vertical displace	Deformation not evident
	Degradation Remarks	Location sho	wn ôi shê map	Degradation not evident
Pe	rimeter Ditches/Off-Site Di	elarge.	(Iplicable)	W.
	Silitation Local Arcal citent Remarks	lica shown on si Depth	é map Silsatica	
	Vegetative Growth Vegetative Growth Vegetation does not in Areal Extent Remarks: V∈ G. S. (A. VEST BANK 0	ipedê (jipiy	own on site map	NA PRAACM I DES ON D'EHNPS FEW SPANSE NAC
3.	Erosion Arcal extent Remarks	Location sha	own on sile map;	Existen not called
4.	Discharge Structure Remarks	Pendoning	WA.	
	w.v.	CTGAL BARR	irrwalls	Applicable WA
Ľ	Seitlement Areal extent Remarks		overcusiik mag	Scalement of system
WE		ngType of moui		

	1x. Groundwater	vsurface water remedies	Applicable (VA)
A. Gro	undwater Extraction Wells	, Pumps, and Pipelines	Applicable N/A
	Pumps, Wellhead Plumbin Good condition Remarks	ng, and Electrical All required wells properly operating	Needs Maintenance N/A
	Extraction System Pipelin Good condition Remarks	ies, Valves, Valve Boxes, and Officer A Needs Maintenance	ppurceasurs
	Spare Parts and Equipme Readily available Remiste	nt Clood condition Requires upgrad	de. Nécele se be provided
B. Ser	face Water Collection Struc	ctuares, Pumps, and Pipelines A	pylitable WA
	Collection Structures, Pur Good condition Remarks	inps, and Electrical Needs Maintenance	
	Surface Water Collection Good condition Remarks	System Pipelines, Valves, Valve Boxe Noces Mannenance	s, and Other Appartenance
38.	Spare Parts and Equipme Readily available Remarks	nt Cood condition Requires upgra	As Next to be refer

. Tres	ument System	Applicable	(NA)	
	Treatment Train (Che Metals removal Air stripping Filters	Oil	nt apply) /water separation thou adsorbers	Bioremediation
	Additive (e.g., chela	tion agent, floccuk		
	Others Good condition Sampling ports prop Sampling/maintenas Equipment properly Quantity of grounds Quantity of surface Remarks	erly marked and fince log displayed and disp	id up to date	
	Electrical Enclosure N/A G Remarks	and Panels (propod condition	city asted and functional) Needs Maintenance	
L	Tanks, Vaults, Stors IVA Remarks	ge Vessels lood condition	Proper secondary com	almment Needs Maintenan
.	Discharge Structure N/A Remarks	and Appurtenant lood condition	Needs Malatenance	
5	Treatment Bullilling N/A Chemicals and op Remarks	(s) Good condition (es inputicus properly st	o, coof and doorways)	Needs repair
8	Monitoring Wells (Properly secured/ All required wells Remarks	ocked Functioni	a remedy) ng Routinely sampled Needs Maintenance	Good condition NA
D, M	outhering Data			
I.	Modiuming Para	es en contien (on t	ine (E-of execuable	guis
2	Monitoring data: av	gate 179 CH	HEES IN GUINDING	ocentrations are declining

Mo	[상태 [창송] [1] 보고 있는 그렇게 보고 있는 그렇게 되었다. 그렇게 되었다.
	nitored Natural Atlenuation
	Monitoring Wells (natural attenuation remedy) Properly secured/locked Functioning Routinely sampled Good condition All required wells located Needs Maintenance IVA Remarks
243-14-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	X. OTHER REVIEWES
tia	there are remedies applied at the site which are not covered above, attach an inspection sheet describing a physical mature and condition of any facility associated with the remedy. An example would be soil por extraction.
ville	XL OVERALL OBSERVATIONS
	Implementation of the Remedy
は、大学語	designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plane, minimize infiltration and gas emission, etc.). ASPHALI CAP INSIALLERS OVER PERMON GRAVEL PARKING LOT TO CONTROL INFLUMIATION & PREVIOUS SEPARATION. I' SOIL CAP IN NORTH PERTION TO PROVIDE SEPARATION FROM PREVIOUS SLAG PILE DISPOSIL/STREINS ANEN, 150 768
	Assequence OSM

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or acope of O&M or a high frequency of unscheduled regains, that suggest that the protectiveness of the remedy may be compromised in the future,
rsii. E	
land of the	2.25
D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. $No \approx \mathcal{E}$
.	

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

	ÖRMATION
Site name: QAREA AOC 1/2_	Date of Inspection: 7-27-02
Location and Region: NSN NOLFOCLVA	RPA D:
Agency, office or company leading the five-year review: 412 M HILL	Weatherflemperature: 70° HOT SUNNY HUMIN
Access controls	Monitored natural attenuation Groundwater containment Vertical barrier walls PAPERE ONLY -SUE SYSTEM OFF
Aftachments: Inspection team roster attached	Site map attached
	(Check all dust spriy)
	(Check all that apply) SUPSILIMICATION Title Date Depo. SPARES ONLY AND SUE DUE

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Problems; sug	Name gestions; *	Report ausched	Tile	Date	Phone no.
Agency Contact					
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Problems; sug	Name gestions;	Report attached	Title	Date	Plone no
Agency					
Problems; su	Name gestions;	Report stached	Title	Dete	Plone or
Other laters		nal) Report site			
			gggranguning a che i jek jii i kudhilibilik		

l.	O&M Documents		
rv,	O&M manual Readily available	Up to date	N/A
	As-built drawings Readily available	Up to date	NA
i	Maintenance logs Readily available	Up to date	N/A
	Remarks and the second of the		
2	Sile-Specific Health and Safety Plan Readily availa	ale Up to date	NÀ
	Contingency plan/emergency response plan Readily availal Remarks	ble Up to date	NA
3.	O&M and OSHA Training Records Readily available	Upordate	WA
	Remarks Average ON Server	Commission of the second secon	
4.	Permits and Service Agreements		
	Air discharge permit Readily available	Up to date	NA
34	Elinest discharge Readily available	Up to date	NA-
	Waste disposal, POTW - Readily available	Up to date	NA
	Other permits Readily available	Up to date 2 By Fwc	WA
	ROMATICO MPRESSON WAYOU HANDUN	1 By rwe	erikali se Bali Piagasi
3.	Gas Generation Records Readily available 1	Ip to date N/A 1	
	Remark		<u> </u>
** **			
e.		Up to date.	N/A
c	Seffenant Monument Records Readily available	Uniociale	
4.4211	Remarks Settlement Monument Records Readily available		WA,
c	Settlement Monument Records Resulty available Remark Groundwater Monkoring Records Constitution of the C	Up to date	WA NVA
c	Settlement Monument Records Resulty available Rement Groundwater Monttoring Records Resulty available Rement Monttoring Records Resulty available Resulty avai	Up to date	WA,
c	Sefficient Monument Records Resulty available Remark Groundwater Monitoring Records Constant	Jow and the second seco	WA WA
	Sefficient Monument Records Resulty available Remark Groundwater Monkoring Records Constant Production Results Constant Results Consta	Up wo date	NA NA
	Settlement Monument Records Readily available Remark Groundwater Monitoring Records Readily available Remark Leacher Edward Records Readily available Remark Discharge Compliance Records Are Readily available	Jow and the second seco	WA NVA
	Sefficient Monument Records Resulty available Remark Croundwarer Monkoring Records Crounds	Up to date Up to date Up to date Up to date	WA WA

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		ALR P

	O&M Organization State in-house PRP in-house Petieral Pacility in-h Other		Contractor for State Contractor for PRP Contractor for Federa	d Pacility
	O&M Cost Records Readily available Punding mechanism Original O&M cost es	Up to da /agreement in p firmate	lace	aktiown attached
		ital annual cost	by year for review per	riod if available :
	From To	Ding	Total cost	Breakslown attached
	Prom To	Date	Total cost	Breakdown attached
	From To_	Date	Total cost	. Breakdown attached
	Prom. To.		Topi est	Breakdown attached
	From To_	Date		Breakdown attached
	Dic.	Dác	Tool cost	
3.	Unauticipated or Un Describe costs and rea	usually High C	&M Costs During R	leview Puriot
	V: Access	and instri	JIIONAL CONTRO)LS Applicable @
Ŗ	ending.			
¥	Peacing camages Konsels		n diova (cr. no nap	
0	llier Access Restrictions			
	Signs and other secu	Brown of the State		oren on sile map:

					t No. 9355.7	
Ins	ditutional Controls (ICs)	ing strain in the second secon				
	Implementation and enforcement Site conditions imply ICs not properly implemented Site conditions imply ICs not being fully enforced		Ye Ye		NA'	خد ا
	Type of monitoring (e.g., self-reporting, drive by)		<u> </u>	ING.		- -
		, MGR		-74-02	40-3	
				Jabb	Phone no	L.
	Reporting is up-to-date Reports are verified by the lead agency		% %		NA NA	
	Specific requirements in deed or decision documents! Violations have been reported Other problems or suggestions: Report attacher		e Ye Ye	50 B.	NA . NA .	مسر
	Adequacy (Cate adequate)	le sue in	adequate		. NA	
	Adequacy Que adequate Remarks (1904 ON 1900 A)	A OC.	adequate			
	Adequiscy Que adequate Remarks 6.904 ON DEON AT PROPERTY UNITE BOLLAND	A OC.				
	Remarks bock on book An	A OC.				
r G	Remarks LOCK ON DOOR AT Protecting WILL BOLLAND	A.9.~				
	Remarks LECA ON PROPERTY AND PROPERTY OF SHEET AND PROPERTY OF SHE	A.9.~				
	Remarks LSCV ON PROPERTY AND PROPERTY WILL BELL AND PROPERTY WILL BELL AND PROPERTY WILL BELL AND PROPERTY WILL BE	A.9.~				
	Remarks LSCV ON PROPERTY AND PROPERTY OF THE REMARKS AND PROPERTY OF THE P					
	Remarks (LS) CV ON PROP. AT REPLACED LAND AND A STREET LAND AND A					

	Remitte		
		ANDFILL COVERS Applicable (
, . , .	adm Surface		
	Scittlement (Low spots) Areal extent Remarks	Location shown on site map, Depth	Seilement not evident
	Cracks Lengtis Remarks	Location shown on site map Widths Depths	Cracking not evident
	Ecosion Areal extent Remarks	Location shown on site map. Depti	Exaion not exident
	Hotel	Location above de alternape Depth	Holes not evident
	Vegetativé Cover Trece/Shubs (indicate) Refinité	Genes Cover project/ éstabél 1220 poil locations on a diagram	No sign of
	Alfernative Cover (arms Remarks	prod rock concrete; ctc.) NVA	
	Bulges Areal extent Reports	Localita shown on the map	Bulges not evident

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) .			
*	Wet Areas/Water Damage Wet areas	Wet areas/water damage not Location shown on site map	
	Ponding	Location shown on site map	
	Sceps	Location shows on site map	
	Soft subgrade Remarks	Location shown on site map	Areal estime
	Slope Instability SII Areal extent Remarks	Localing bown on sile map	No evidence of slope Instability
, p ,	sacties Applica (Horizontally constructed main order to slow down the ve	ble NGO owner of carth placed across a steep lan locity of surface runoff and intercept a	dfilf side slope to intempt the slope ad convey the runoff to a linea
	Flowe Bypass Bench Remarks	Location shows on side hap	NA or obsy
	Bench Breached Remarks	Location shows on sile map	N/A or okay
	Besteli Overtopped Remidei	Location shown on sile map	N/A crossy
		control mats, tipusp, grow bags, or gal- will allow the munoff water collected by	
	Scattement Area extent	Location shows on site map N	o cyldence of actilement
İ.			
	191 4 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Continue of department

L	Undercutting Location shown Areal extent Depti Remarks		No evidence of undercutting
: 5 5 ,	Obstructions Type Location shown on site map Size Remarks	Actes	No obstructions
6.	Excessive Vegetative Growth No evidence of excessive growth Vegetation in channels does not obstruct f Location shown on site map Remarks		
D, C	over Penetrations Applicable	2	
	Gas Vents Active Properly secured/locked Projectioning Evidence of leakage at penetration N/A Remarks	Passive Routinely sau Need	pled Good condition b Maistenance
	Gas Monitoring Probes Properly secured/locked Punctioning Byticance of leakage at penetration Remarks	Ropilitely and the control of the co	
3 ,	Monthering Wells (within surface mea of le Property secured/focked Functioning Bytidesce of leakage at penctuation Remarks	Restrely say	ipled Good condition ds Makashoc VA
	Leadiste Extraction Wells Proyectly sequest/ocked Reactioning Bysical of leakage at possibility Remarks	BURNING THE	Epike! Good continue.
5.	Settlement Monuments Loc Reports		etinely, accepted NVA

E. G.	s Collection and Treatment	Applicable	NA.	
Î.		rmal destruction de Maintenance NOT W	Collection for reuse SVE SYSTEM USE BUSE USE BUSE	D COV. OC.
2.		ds Mainterance		
3	Gas Monitoring Facilities (e.g., Good condition Nee Remarks	gas monitoring of a ds Maintenance	djacent homes og buildin N/A	
P. Co	wer Drainage Layer	Applicable		
	Outlet Pipes Inspected Remarks	Punctioning.	\$\A	
2.	Outlet Rock Inspected Remarks	Punctioning	NA THE STATE OF TH	
G, D	etention/Sedimentation Ponds	Applicable	(MPL	
1, 2.	Silvation Areal extent Silvation not evident Remarks	Jeph.		
2.	Erosion Areal extent Brosson not evident Remarks			
3.	Outlet Works Pur Remarks	ordoning NA		
4.		sctioning IVA		

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I. R	taining Walls	Applicable NA	
	Deformations Honzontal displacement Kotational displacement Remarks	Location shows on site may Vertical disp	
	Degradation Remarks	Location shows on site may	Degradation not evident
, Pe	rimèler Ditches/Off-Site Di	scharge Applicab	e WA
L	Sittation Local Areal catent Remarks	sion shown on site map Siltar Depth	Non not evident
	Vegetative Growth Vegetation does not in Areal extent Remarks	Location shows on site ma spede flow Type	
3. 2.*	Erosion Acel extent Remarks	Location shown on site man Depth	P. Broslina not evident The Research Market
4.	Discharge Structure Remarks	Punctioning N/A	
	t la la Ville Vi	TICAL BARRIES WALLS	Applicable (VA)
	Selfement Association Remarks	Cocation shows on after me Depth	Seitement not existent
2	Performance Monitori Performance not mon Pisquery Kend differential Remarks		Bytesse of breighting

<u></u>	LX. GROUNDWATER/SURFACE WATER REMEDIES APPLICATED INA
A. Gn	oundwater Extraction Wells, Pumps, and Pipelines Applicable N/A
	Pumps; Wellhead Plumbing, and Electrical Good condition LAll required wells properly operating Needs Maintenance: N/A Remarks
	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances Chod condition News Maintenance Remarks CLE SYSTOWN FUNCTION: PS AUT AUT TURNOW UN
\$ >	Spare Parts and Equipment Readily available Good condition Requires upgrade Needs to be provided. Remarks ON SITE
B. Su	ofsce Water Collection Structures, Pumps, and Pipelines Applicable (NA)
1.	Collection Structures, Pumps, and Electrical Good condition Needs Maintenance Remarks
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances Good conflicion Needs Mainsenance. Remarks
3.	Spare Parts and Equipment Readily svaliable Good condition Requires upgrade Needs to be provided

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable,")

LSORINE	ORMATION
Site name: CO LANDFILL	Date of inspection: 7-29-02
Location and Region: NSN, NORFOLKVA	
Agency, office, or company leading the five-year review: CHEM HILL -NAVY CLEAN	Weather/lemperature: 90 S HOT HUMIN SUNNY
Access controls	Monitored natural attenuation Croundwater containment Vertical bander walls
Affactments: Inspection team roster attached	Shima) ametri
III-KTEVIEWS	(Cleck all that apply)
I. O&M site manager Name Interviewed at site at office by phone Pho Problems, suggestions: Report attached	Title Date
2. O&M staff Name Interviewed at site staffice by phose Pio Problems; suggestions: Report attached	

	IX. GROUNDWATERSURFACE WATER REMEDIES APPLICATE NA
A. Gı	oundwater Extraction Wells, Pumps, and Pipelines Amilicable NA
1.	Pumps, Wellhead Plumbing, and Electrical Good condition LAlf Topulred wells properly operating Needs Maintenance N/A Remarks
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances Glood condition Needs Maintenance Remarks (12 547521 PUNCTIONING BUT NOT
3.	Spare Parts and Equipment Readily available — Good condition Requires upposite Needs to be provided Remarks ON () 1 6
B. St	rface Water Collection Structures, Pumps, and Pipelines Applicable (VA)
1.	Collection Structures, Pumps, and Electrical Good condition Needs Maintenance Remarks
2	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances Good condition Needs Maintenance Remarks
3.	Spare Parts and Equipment Rescriby scalable Good condition Requires tograde Nocda to be provided. Remote

i ermine

C. T	reatment System	Applicable	NA		
1,	Treatment Train (Metals removal Air Skipping Filter	Check components that Oil/w Carb	ipply) ates separation in adsorbers	Bioremediation	
	Othern_A-S_				
141	Sampling/mainte Equipment prope	roperly marked and find mance log displayed and	we to date		4 60 4 4
	Quantity of surfa Rémarks AS	co water treated annually		THIE CREVIE	<u>ser</u>
E ;	Electrical Englosus N/A < Remarks	ca and Panels (project)	rated and fractional) Needs Maintenance		
	Tanks, Vaults, Sto Wal Remarks	rage Vessels Good condition	Proper secondary co	nafafinment Needs Main	triance.
!	Discharge Structus Side Remarks	re and Appintentances Good condition	Needs Maintenance		
	Chemicals and co	Coorcondition (esp. 10 Lipporar property store CUDISCO	SULATION /	Neols (epair VV 5) DE (>-) V 0 (Ocos	
	Montioring Wells (Properly secured wells of the countries of the countrie	pains and treatment real locked Puttelloring a located Meets	Rity) Koutinely sampled Manufacture (60/cm/44 D	Cood condition NA NMAGON SUNJA O SW-4, NEED CA	i.
D. M	onkloring Data			TV-L	
L.	Monitoring Data Lis routin	cly submitted on time	ls of sceptable	(maley	
2	Monitoring data sug Groundwater plu	gesta: me is effectively consin		uroccubations are decilining.	

D. Mo	altored Natural Attenuation
	Moultoring Wells (natural attenuation remedy) Properly secured/locked Functioning Routinely sampled Good condition All required wells located Needs Maintenance Remarks
ara luci terc	X: OTHER REMEDIES
th	there are remedies applied at the site which are not covered above, attach an inspection sheet describing a physical nature and condition of any facility associated with the remedy. An example would be soil appreximents.
	XL OVERALL OBSERVATIONS
Æ	Implementation of the Remedy
	Describe issues and observations relating to whether the remody is effective and functioning as designed. Begin with a brief statement of what the remody is to accomplish (i.e., to contain contaminant plane; maintains infiltration and gas emission, etc.). Ava. SPAN (E WASLLS MADE CONNEW YOUR PAMELY OF THE LITTLE OF SYSTEM NOT BETWEEN OUR TO DUE TO NOT SYSTEM NOT BETWEEN OF SAMPLING INDICATES THAT PLUME IS CONTAINED ADDITIONAL OF CONTAINED AND SAMPLING OF CONTAINED ASSETS. THAT PLUME IS CONTAINED ADDITIONAL TOO CONTAINED TO NEED TO DESERT OF THE TWO WEEKS OF
i,	Altequacy of O&M
で、一般では、一般である。	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. Proceedings Procedings Proceedings Procedings Procedings Procedings Procedings Proceedings Procedings Procedin

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

A STEELNE	ORMATION
Sife name: CD LANDFILL	Date of inspection: 7-29-02
Location and Region: NSN, NORFOLK,VA-	EPAID :
Agency, office, or company leading the five year seview: CH2M HILL -NAVY CLERM	Weather/temperature: 90 S HBT HUMIN SUNNY
Access controls	Monitored natural attenuation Groundwater containment Vertical barrier walls
#####################################	
Attackments: inspection team roster stacked	Site map attached
	Site map attached (Check all that apply)
	(Check all time apply) Trile Date
IL INTERVIEWS 1. O&M tite manager Name Interviewed at site at office by phone Pho	(Check all time apply) Trite Date
IL INTERVIEWS 1. O&M tite manager Name Interviewed at site at office by phone Pho	

Contact	Nine		na an a	Date	Phone no.
Probleme:		Report attached		Vals	ETIODS IR)
				<u>na wasan da Lagar</u>	
Agency_					
Contact	Name		Title	Date	Phone no.
Problems;	suggestions;	Report attached			- LUVIE; III)
American					
Agency_			e e e e e e e e e e e e e e e e e e e	4	
Combact	Name			Date	Place no.
Problems;		Report attached			
Agency_					
Contact_	Name		Title	Date	Phone no
Problems;	suggestions;	Report attached			
Carlo Market Constitution					and the second
		nal) Report effected			
- Vac- un	erviews (optio				
10. 10.20 (18.7) 10.5 (1.7) (1.5) (1.5) (1.5)	FI (FI				Her Strain Strain
	id III. Zana zawa Katan zana			ne ne summer de la se	
average of the second	and the second			والأوجاء والراحي ما ومووو التمثية	ministerania (1771), et ins <u>istif</u>
	ra aa K				2006 1 1000 1000 1000 1000 1000 1000 100
	etia. Maria				
Title of the second	sewe a muse eting t	- 19 - 1-1-1-1-1	<u> </u>	garage generalization of the state of the st	a en la
. 4	100000000000000000000000000000000000000	£1 A07.547	4. ""		

a:	O&M Decuments Q&M manual As-built drawings Maintenance logs Remarks	Readily available Readily available Readily available	Up to date Up to date Up to date	NA L NA NA C
<u>V</u>	Site-Specific Health and Safety Plan Contingency plan/energency response plan Remarks	Resely available Resely available	Up to date Up to date	NVA ^C VA
jan ka	O&M and OSHA Training Records Remarks	Readily available	Up to date	WAS
<u></u>	Permits and Service Agreements Air discharge permit Efficient discharge Waste disposal, POTW Other permits Remarks	Readily available Readily available Readily available Readily available	Up to date Up to date Up to date Up to date	NA - NA - NA - NA -
S.	Ga Generation Records Readily Remarks	wellable Up to d	a NA	
6.	Settlement Monument Records Kennets	Redity avalable	Up to date	WW -
				- C
7.	Croundwater Monitoring Records Romatis	Readily svallable	Up to date	T WA
		Residity evaluation Production Residity evaluation Residity evaluation Residity evaluation Approximation to the control of the control o	Up to date Up to date	NA*
	Romatic 1995 1995 1995 1995 1995 1995 1995 199			

		of pind o	Į.	v. O&M Costs	
	O&M Orga State in-l PRP in-h Foderal F Other	ouse		Contractor for State Contractor for PRP Contractor for Pederal	Pacific
	A SA	A Wale and the	3/3 11 111		
	OdeM Cost Readily a Punding Original Od	cvailable mechanism/	Up to dat agreement in p	800	skowa attaciesi
	10 10 10 10 10 10 10 10 10 10 10 10 10 1	Tol	al annul cost	y year for review per	iod if available
	From	To	orania in the same of the same		Breakdown strached
. j.: 1	Prom	ite To	Date	Total cost	Breakdown strached
		10 ate	Date	Total cost	
	From	To_	Date	Total cost	Breakdown attached
	From	To			Breakdown attached
	D From	etc To	Date	Total cost	Breakdows stisched
		ale:	Dato	Total cost	
ð	to annual seek and a personal				roteriores established by the control of the contro
.		sted or Unit osts and cas		&M Costs During R	erkw Pedod
	<u>, 1. 356 J</u>	4 Table 4			
		Yarib Yaning Itilika			
				inneren ar de	
			wiisiid	TIGVA SONYK	
		Acass	AND DESTANCE	INGNAL CONTRO	
	Reacting d		Messa	HENAL CONTRO	
,	Reacting d	mend Silvin Asile il	location Percett / Percett / p = W		

	Implementation and enforcer Site conditions imply ICs not p Site conditions imply ICs not b	coperly implemented	(C) Yes	No No	NA NA
	Type of monitoring (e.g., self-r Propiency <u>*6.442-21-1-144-4</u> Responsible party/sgency	eporting diffe by) Geowald Land C PL Ro	1150 M	2N17	oews
A#	Contact Ks & France	Tide	<u>2-2)-</u> Date		160 3734 Phone no.
	Reporting is up-to-date Reports are verified by the lead	fagency.	8	No No	NA NA
	Specific requirements in deed of Violations have been reported. Other problems or suggestions:	or decision documents have been m : Report attached		No No	8
<u> </u>	Adequacy Remarks	Os are adequado Ca are in	sidequate 2 P. K.A.L.	11.73	WA
L'in T	Adequacy Remarks SILGHT FT DETATION DU HAVE OF CAN	FINCE DAMAGE TO	adequate 2 P. R. R. L. N. R. A. W. C. G.	IA C	NA S FASTOR
i c	Remints S. 1441 TO DET 4- How DU HALE OF LAND	TVCE DAMAGE TO G NORTH OF EN	adequate of MAIL AMANCE		5 5 4 3 7 5 4
	Remarks S/1441 FT DET44 Hove DU HALE AT CANY control Vandalism/trespossing 1	Ocation shown on after map	o P R AIL NAANLE		5 5 4 3 7 5 4
	Remarks S. J.A.H. D. D. J. L.		o P R AIL NAANLE		5 5 4 3 7 5 4
	Remarks OCIA- HON Cheered Validatisto/frespassing Remarks Early the Changes on site Remarks Plant the Changes of the hanges of the Remarks Plant the Changes of the Changes				5 5 4 3 7 5 4

b. Ou	er Site Conditions	
21. - 1 1 1.	Remarks SITE IS HEAVILY VOUS TATED & IN NOTES 67 MOWING. VERSTATION THOUGHOUT RIP-RA CINED CHANGE ON AND CORNER OF EAST PORTION 07 CANOPILL	V
140,00000 110,00000	VIL LANDFILL COVERS (Applicable NVA	
A, La	dfill Surace	والمستعالية
l.	Settlement (Low spots) Location shown on site map. Settlement not evide Areal extent Depth Remarks HEAVY VEGETATIVE GOVERS	B
2.	Cracks Location shown on site map Cracking not evident Lengths Widths Depths	
	Remarks HENNY VEGETATIVE COVER	
	Erosion Location thown on site map Stocke by the Areal extent Depth COVER -	
	Holes Location shown on site map Cloic in critical Areal extent Depth Remarks LIPANY CEREVATIVE COVERS	
	Vegethit's Cover (Gras) Sover property established) (Ne signs of Trees/Shrubs (indicate size and locations on a diagram) Remarks AVD TREES OR SIEVES - GILASS /AV NEws	
Ğ.	Alternative Cover (armored rock, concrete, etc.) INA Remarks, Down CHICLES GARDONS IN 4000 SIGNAS RIPARP CHINNISS DIMIG STANDISHOU VENETALIS))):
7.	Bulles Location boyn on site now Bulles Arcal orders Height Lemants Hoge Location boyn on site now Bulles Lemants Hoge Location boyn on site now Leman	

•	Wet Areas/Water Dama Wet areas Sonding Sceps Soft subgrade Remarks HEAVY IN Soll LIACE	1.0 1.0 1.0 1.0 1.0 1.0	et areas/water damage cation shown on site cation shown on site cation shown on site cation shown on site Arre Caves Area Caves	map Areal map Areal map Areal map Areal	extent extent extent extent extent Powplas With CASTOR	<u>-</u>
gare Ja	Slope Instability Areal extent Resnacts	Slides La	cation shown on site	map: <u>((ဝင်)</u>	dence of slope instal	
	hes Appl (Horizontally constructed in order to slow down the channel)		th placed across a ste			
	Flows Bypass Bench Remadis		scation skowa on sie		N/A or (Sap)	
	Bench Breached Remarks	Location si	nown ou site map	14	(
	Benck Overlopped Remarks	L	ocation shown on site	anap	NA (coleny)	
C. Letd	iown Channels App (Channel lined with eros side alope of the cover as landfull cover without cre	d will allow th	s amost water collect		escend down the stee to move off of the	8
	Scittlement Areal extent Remnts	Location s Dep		(No evidence	of estaury	
	Material Degraciation Material type Remarks		Egypt on 2002 mag M carbon	Not of the		No.
	Excelor Alreal extra: Resource	Location Do	Bows (at sife may	€ No calling	ofaces	
						* *

	Undercutting Location shown on site map No evidence of undercuttings. Areal extent Depth Remarks:
	Obstructions Type Location shown on site map Areal extent Size Remarks West Side of 60" Culvert Afficients to Have Board RURPOSCUY DAMMACO WITH MORKETS IN PROPER FLOW & PROMOTIC SITUATIONS
	Excessive Vegetative Growth Type Wesnel Growth No syldency of excessive growth Vegetation in channels does not obstruct flow Location shows on site map Artal extent Remarks Excessive Growth 3 - Woven Site May IMPerpes Flow Declare Heavy Storm Event, Dut Libritain Extent
D, C	over Penetrations Applicable (VA)
	Gas Vents Active Passive Properly steamed/locked Panetioning Routinely sampled Good condition Evidence of leakage at penetration Needs Maintenance N/A: Remarks
	Gas Manitoring Probes Properly seased/locked Punctioning Routinely sampled Good condition Byldenes of lestage at penetration Needs Maintenance N/A Remarks
	Monitoring Wells (within surface area of landfill) Properly secured/locked Practioning Routinely sampled Good condition By/dense of leakings at pencination Noeds, Maintenance WA Remarks
	Leachate Extraction Wells Property sound/ocked Positioning Rounely surpled Good condition Byticing of leakage at penetusion Needs Manuscrate WA Remarks
5 .	Schience Moonaces Locatel Routies anveyed WA

	s Collection and Treatment	Applicable	(AM)	1944	:
I.	Gas Treatment Facilities Flating Good condition Remarks	Thermal destruction Needs Maintenance	Collection for	reuse	
					2000 × 100 TOUS
2.	Gas Collection Wells, Man Good condition Remarks	ifolds and Piping Needs Maintenance			\$):
3.	Gas Manitoring Facilities (Good condition Remarks	(e.g.), gas monittaing o Needs Maintenance	f wijscent homes or N/A	buiklings):	
P. C	over Drainage Layer	- (Frederick)	N/A		
k.	Outlet Piper Inspected Remarks 1652 Southware	Sincioning		and the control of th	male.
	HAS BODY CRUM	etto ouring n	now in a buent	3 BUT STILL	FUNCTION
2.	HAS BED CRUM Outlet Rock Inspected Remarks OUTLETS S THAT LANTAINS	Public AURING A Proceedings TO PLANT TO	CRASS - LAND	3 BUT STICE) , pf.Minage	EWC116AH EANAL
2. G D	Outlet Rock Inspected Remarks OUTLETS S	Tes over a Proviouing Television Source amove	CICASS - LAWS CICASS - LAWS OF CICA') OF	is but stice) , plainage Signalogi	EWC116AH EANAL
	Outlet Rock Inspected Remarks OUTLETS S THAT LONGARAS etention/Sedimentation Pond	Tes over a Proviouing Television Source amove	NOW IN A EXEMPLE CIRCLES - LAWREN OF CL-21) OF OUR	is but stice) , plainage Signalogi	EUNCIIALI EANAL WAIGA
G, p	Outlet Rock Inspected Remarks OUTLESS THAT CONTRIANS etention/Sedimentation Pond Situation Areal entent Situation not evident	Piero Ovajak n Ponetioning TO-DAGHT TO SOLATE BYMOVA i Applicable Dept	CILASS - LAWS (122) OF	3 BUT STICE) , DAMINAGE STAMBING (EUNCIIALI EANAL WAIGA
	Outlet Rock Inspected Remarks OUTLESS THAT CANTAINS etention/Sedimentation Pond Stitution Areal extent Siliation not evident Remarks Erosion Areal extent Brosion not evident	Punctioning (Represented for Secretary Applicable) Depte	CILASS - LAWS (122) OF	3 BUT STICE) , DAMINAGE STAMBING (EUNCIIALI EANAL WAIGA

L R	ctaining Walls	Applicable	(MY)		
i i	Deformations Horizontal displacement Rotational displacement Remarks	Location shot	vn on site insp Vertical displac	Deformation not eviden	
	Degradation Remarks	Location sho	wa oa ike map	Degradation not eviden	
Fe	rimeter Ditches/Off-Site Dis	harre	(Applicable)		Manufacture Comments
	Areal extent / 50 - 200	Depth MODEL OF	G-8 ETHA	WATER - SW CO	ENOR DEPARAC G
	Vegetative Growth Vegetation does not imp Areal extent Remarks: Southone Garants	nede flow Type Paalwassc	ANAL BELL	NA IPANS TO BELOME AMERIC OF POPULA	ONCREGON WARST CEAST SIN
		Location sho	vin (citalicana)	na pantings, pagamananan an ang atau an a	(1) (1) (2) (1) (2) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4
/	DUE TO JILIAN	Princtioning ACM OSE AN OF CH	ANNEL FO	E NOT FUNCTION'I C 150'-200' UPS Applicable (VA)	MC (EATHERN SIVE ROOMS
8	Settlement Areal extent Remarks	Location sk Depth	GENTOÉS AO INTE	Settlement act o violent	
	Performance Monitorin Performance not monit Richeny Head differential Remarks			idence of inserting	
	J GRASS MATT DUE TO SPACE	ing Ha Use esta	s Buen c Blishwea	STUDIES UNDER 17 ST VEGETATIO	DIFF. WAR
					ASSESSMONT

1 to 1

: ·	IX. GROUNDWATER	SURFACE WATER R	emedies a	pplicable 💰	iD)
L Gro	oundwater Extraction Wells	, Pumps, and Pipelines		Applicable	NA
	Pumps, Wellhead Plumbir Good condition Remarks	ig, and Riectrical All required wells prope	aly operating N	eeds Maintenkoc	, N/A
	Extraction System Pipelin Good condition Remarks	rs, Valves, Valve Boxes, Needs Maintenance	and Other Appu	(Consider	
	Spare Parts and Equipme Readily available Remarks		òquics upgrade	Needs to be po	widel
8. Su	rface Water Collection Stru	ctures, Pumps, and Pipe	liae Appli	able (VA	
!.	Collection Structures, Pu Good condition Remarks	mps, and Electrical Needs Maintenance			
2	Surface Water Collection Good condition Remarks	System Pipelines, Valve Needs Maintenance	s, Valve Boxes, a	nd Other Approx	
5.	Spare Parts and Equipm Readily systiable Remade		Sequires Vogracio	News to be p	wyłce!

) •u	Treatment Train (Chec	r commonents that	analy)	[19] [20] [20] [4일 (19] [20] [20] [20] [20] [20] [20] [20] [20
	Metals removal	Oil/v	vater separation	Biotemediation
	Air stripping Filters		on adsorbera	Section in the Administration
	Additive (e.g., chelatic	on agent, flocculen		
	Good condition Sampling ports proper Sampling/maintenance Equipment properly is	ly marked and fine log displayed and lentified	l up to date	1950 - 1 550 - 1550 -
	Quantity of groundwa Quantity of surface w Remarks	ater treated annual		
2.	Electrical Enclosures a N/A Goo Remarks	nd Panels (properi d condition	ly rated and functional) Needs Maintenance	
3.	Tanks, Vaults, Storage N/A Goo Remarks	Vésselé d condition	Proper secondary con	fairment Needs Maintenance
4	Discharge Structure at N/A Go Remarks	nd Appartenance od condition	Nexts Maintenatics.	
Š .	Treatment Building(s) N/A Go Cliemicals and equipa	od condition (esp. 1	coaf and doosways)	
6	Monitoring Wells (pm Properly secured/lock All required wells loc Remarks	red Functioning	snety) Routkiely sampled kis Maintenance	Good condition NA
n M	estoring Data			
Tanana a sa		<u> 2008 - 2000 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005 - 2005</u> Notes and the contract of the		
L.	Monitoring Data If routingly	submitted on time	(Ligital beptalle	qualley.
2.,	Monitoring data sugges // Groundwater plume	is: Sefferively conf	ingi Comanipation	i, vidations me declining

CONCLUSIONS HAVE BEEN MADE

D. Mor	lifored Natural Affenuation
	Monitoring Wells (natural attenuation remedy) Circular secured/locked Functioning Routinely sampled) Clood condition All required wells located Seeds Maintenances NA Remarks Clim MONITORING REFT VSUMR REPUREMENTS
	X. OTHER REMEDIES
et i	there are remedies applied at the site which are not covered above, attach an inspection sheet describing physical nature and condition of any facility associated with the remedy. An example would be soil por extraction.
	XL OVERALL OBSERVATIONS
	Implementation of the Remedy
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plants, minimize infiltration and gas emission, etc.). THE CANDFILL CAT SCRUES TO PROVENT (NFILTRATION OF TREE) PITATION INTO THE LANDFILL, THE CAP IS FUNCTIONING AS DESIGNATO AT DETERMINATO DURING SITE VISIT, I DESIGNATO AT DETERMINATO DURING SITE VISIT, I DESOMMEND PERFORMING IN SPECIONAL AGAIN DURING NADIO—GRADULTA SCREEN TO PROVIDE ADDITIONAL VISIBILITY FROM NEAFTAILULT THAT WAS COVERING MANCH OF THE SHE
B .	Adequacy of O&M
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. ### SIGNIFICANT HEIGHT OF GRASS WAS OBSCREEN. ON THE LAND FILL - MORE PREGUENT MONUTUS! **LENGTRUNG IS RECOMMENTATION SOME VEGETATION** HAS ESTABLISHED THROUGH GABONS IN THE BOWN CHUTES, WHICH MEETS TO BE REMOVE DOWN OF DESCRIPTION OF DESCRIPTION OF

C:	Early Indicators of Potential Remedy Problems				
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of inscheduled repairs, that suggest that the protectiveness of the remody may be compromised in the future. An owner (CUS ANGAIC PRESSUENCY SHOULD BE INCYEM STORY)				
	EROSION REPAIRS DATE COMMON FOR A LANDENL CAP OF THIS NATURE, NETTO ATTEMS OF ESOSION HER NOT COMPROMISING THE EFFECTIVENESS OF THE CAP SYSTEM.				
D.	Opportunities for Optimization				
5 · · · · · · · · · · · · · · · · · · ·	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. A-/A-				
	The second program of the control of				

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

L SITE INK	DRMATION
Sile name: L (-20	Date of inspection: 7-29-02
Location and Region: NSN, NORFELL, VA	
Agency, office, or company leading the five-year review: CIFLAHILL -WHIY CLEAN	Weather/temperatures 90'S SDNNY HOT HUMLD
Access controls	Monitored agural attentiation Groundwater containment Vertical barrier walls
Attachments: Inspection team mater attached	Site map stracted
il interviews	(Check all dat soply)
L O&M site manager MAKE PISARELE Name Interviewed Site at office by plane Pho Problems, suggestions: Report attached	SUBSICINIENTEN 7-29-0 Title Date
	SUPERINTENEN 7-29-02
2. O&M staff MALL P. SARCIF Name Interviewed Graffic at office by phone Pho	Date:

	Local regulatory authorities and response agencies (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.					
	A single state of the state of	o de la companio de constante de la companio de la Companio de la companio de la compa				
	Name Problems; suggestions;	Report stacked		Date	Phone so.	
	Accident					
	Problems; soggestions	Reportabaled	Tite:	Date	Prime 16	
	Agency Costact:			÷		
	Name Problems; suggestions;	Report stracked		Dine	Phote to.	
	Agoney Consect					
Au	Name Problems; suggestions;	Restables.	inde		Pione no.	
4 .						
4	Office Interviews (option					
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				Agende TPelforoniender Agent	## ## A	
1						
A di Caranta			The second control of			

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	III. ON-SITE DOCUMENTS & REC	ORDS VERIFIED (Ch	ck all that apply	<u> </u>
	O&M Documents O&M manual Assbuilt drawings Maintenance logs Remarks	Readily available Readily available Readily available	Up to date Up to date Up to date	NA NA NA
	Sife-Specific Health; and Safety Plan Contingency planfency procy response plan Remarks	Readily available Readily available		WA NA
	OSM and OSHA Training Records Remarks	Readily available	Up to date	NA
	Permits and Service Agreements Air discharge permit Effluent discharge Waste disposal, POTW Other permit Remarks PARA PARAMETS A	Readily available Readily available Readily available Readily available Readily available	Up to date.	NA NA NA NA
3				
: 4 +	Gas Generation Records Results Remarks	evallable Up to	date NA	
		Readily available	Up to date	3//4
18 1	Remarks Selficinent Monnagest Records	Restrict to the second		WA THE PARTY OF TH
	Settlement Monnuceat Bécords Remarks Groundwater Monitoring Records	Restrict to the second	Up to date	
6. 7.	Sefficient Monument Records Remark Groundwater Monitoring Records Remark Leschaly Est notion Records Remark Discharge Compliance Records Air	Readly valiable Readly available	Up to date Up to date	W.

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	idi. <u>Ayroond of Bodes</u> en afan in awasan ya <mark>araw</mark> a ili arawa a ka arawa a	IV. O&M COSIS	
I.	O&M Organization State in-house PRI in-house Federal Facility in-house Other	Contractor for State Contractor for PRP Contractor for Pedecal Pacifity	
2.	O&M Cost Records	h co.dide cas in place Breakslown strached	
	Total min	al cost by year for review period if available	₩
	PromTo		li c d
	Date Date	Total cost Breaklows attac	
1	Date Date	t Total cost	eren eren eren eren eren eren eren eren
	From To Date Date	Breakdown attac	hed
	From To Pair	: Breskilown strac	hed
	From To	Breaktosus enpe	led .
ž.	Date Date	e Total coal	
3.	Usanticipated or Unusually Describe tosts and reasons:	High O&M Costs During Review Terod	
	V: Access And it	STITUTIONAL CONTROLS Applicable	(PA)
A. P	ene e		ominion Maria pronounino principal di Paris Sala
L	Pencins damaged Remarks	ocation shown on the map. Gates securice.	- 144
	Mir Acces Redrictions		
1.	Signs and other security me	aguer Socialism shower on Marinage	304

	Implementation and enfo				en er
-	Site conditions imply IC: r Site conditions imply ICs r	of properly implemented	Lyci		NA NA
	이번 16명 - 16명 등 기계 및 기계	트립한 (1914년 1914년 1일 등학교 1일 등 1일 등학교 기업		2572607	IVA
	Type of monitoring (e.g., s Frequency	elf-reporting, drive by) <u>GW</u>		KS)	
	Responsible party/agency Comact Ben Fra	MANY CLEAN-	CHZA HIUZ Man Da		
	Name	Voltob Prosi Tide	Man 246 Dai		0 373/79 One no.
	Reporting is up-to-date Reports are verified by the	lead agency		A C 200 B C C C C C C C C C C C C C C C C C C	NA NA
	Specific naukements in d	eel or decision documents listve	been met Yes	No	NA'-
	Violations have been repo Other problems or suggest	160		No	NA-
2.	Adequacy Remarks	lCs are adequate 1	Cs are inadequate		NA
774					
k.	Vandalism/trespassing	Location shows an site mag	Consisting	crident	
	Kennet			TAKE PARTIES AND A MARKET	
	Remis				
2.	Land use changes on sit				
2.					
2 .	Land use changes on sife Remarks				
	Land use changes on sit				
	Land use changes on sid Remarks				
	Land use changes on the Remarks Land use changes off the Remarks	VI GENERAL SITE CON	DIFIONS		
	Land we changes on if Remedia. Land use changes off if Remedia. Remedia.	VI. GENERAL SHEEON	DYYONS		
	Land use changes on sif Remarks Land use changes off sit Remarks Coads Applicable Roads damaged	VI GENERAL SITE CON	DYTONS P. Rooks udeque		
	Land we changes on if Remedia. Land use changes off if Remedia. Remedia.	VI GENERAL SITE CO. Location shown on site may	ULTIONS Roads allege		

	Remarks	
-		
		LANDFILL COVERS Applicable (475)
ú	ındfill Swrface	
	Settlement (Low spots) Areal extent Remarks	Location shows on site map Settlement not evident Depth
	Cracks	Location shown on site map Ctacking not evident
	Lengths.	Widths Deptis
	Remarks	
1		
	Erosion	Location shown on afte map
, i	Arcal extent	Depth
	Rémitiks	A CASA MANAGANAN TAN TERMENTAN AN TAN TAN TAN TAN TAN TAN TAN TAN
	HC 6	Location shown on site map Holes not evident
	Areal extent	Cocaton saturit on suo map regies not evident
	Renarios	
	Yegetative Cover	Grass Cover property established No signs of stree
	Remarks	sian and locations on a diagram)
	Allers Hive Cover County	ored pods contetels, etc.) IVA
	Direction 1	
		Company of the state of the sta
	Bulges	Location shown on site map Bulges not evident
	Arcal extent	li di la

	Wet Areas/Water Dama Wet areas Ponding Seeps Soft subgrade Remarks	Locati Locati Locati	reas/water damage no ion shown on site maj ion shown on site maj ion shown on site maj ion shown on site maj	p Areal extent p Areal extent p Areal extent
)	Slope Instability Ascal cauch Remarks	Slide Locat	ion shown on site ma	p No evidence of slope instability
B, Be	(Horizontally constructed	icable (VA) mounds of earth p velocity of surface	laced across a steep le c rumpif and intercept	andful side slope to interrupt the slope and convey the runoff to a lined
L,	Flows Bypass Reach Remarks	Local	Nor shows on site and	Mercey
2.	Bench Breached Remarks	Location show	n on site map	N/A or oksy
				3350 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3. ****	Beach Overtopped Remarks		tion slicyn on site ma	p NA.oroksy
	Remarks sidown Channels App (Channel Bled with eros	licable (VA) on control mats, if id will allow the re	pare, grow baga, or g	
	Remarks Idown Changels App (Channel likel with crost side slope of the cover ar	licable (VA) on control mats, is id will allow the re- isting erosion guilli) prep, grout bags, or g moff water collected. (ss.)	abigus that descent down the steep.
6.12	Remarks Sidowa Chanach App (Channel likel with eron side slope of the cover at landful cover without ex Scittement Areal extent	licable OVA on control mats, is id will allow the re- isting erosion guilli Location show Depth	prop grout bags or g mof water collected est)	abious that descend down the steep by the Desches to move off of the

q.p

4.	Undercutting Areal extent Remarks	Location shows on site map Depth	No evidence of undercutting
	Obstructions Type Location shown on site Size Remarks		No obstructions
	Excessive Vegetative Gr No evidence of excessi Vegetation in channels Location shown on site Remarks	ve growth does not obstruct flow	
D. C	over Penetrations Appl	cable OVE	
	Gas Vents Property secured/locke Byidence of leakage at N/A Remarks		pled Good condition : Maintenance
	Gas Manitoring Probes Properly secured/locks Byldence of leakage at Remarks	d Functioning Routively same	pled Cood condition Maintenancs NA
	Monitoring Wells (with Properly secured/locks Byldence of leakage at Remarks	n surface area of bodfill) d Ruscissing Routirely and penetration Received	pled Good condition 1 Maintenance WA
	Leachate Extraction W Properly secured/locks Byldence of leakage at Remarks	d Punctioning Routinely san	med Good coxilion * Visitation Visitation
Š.	Settlement Moanmest	Located Resid	incly surered NA

E. Ga	Collection and Treatment	Applicable	NA
y v	Good condition Ne Remarks Sシさ しみその	termal destruction seds Maintenance 7.55 7.	Collection for reuse FINDURCH GAC REFORE PTO GAC
Ž y	Gas Collection Wells, Manifol Good condition N Remarks	de and Piping ceds Maintenance	
	Gas Monitoring Facilities (e.g. Good condition N Remarks	gas monitoring of se ieds Maintenance	Jacent hories of buildings) N/A
F. Co	ver Drakage Layer	Applicable	@
	Outlet Pipes Laspected Remarks	Pincioning	
2 ,	Outlet Rock Inspected Remarks	Functioning	
G.D	etention/Sedimentation Ponds	Applicable	
k i	Siliation Areal extent Siliation not evident Remarks	Desh	
2	Erosion Areal extent Broslon not evident Remarks		
8.		Austioning IVA	
A .	Dam Remarks	Americality NA	

H, R	etaining Walls	Applicable	(NA)		17.7%
	Deformations Horizontal displacement Rotational displacement Remarks	Location shows	oo site map Vertical displace	Deformation not evident	
2.	Degradation Remarks	Location above	C Ste new	Degradation not evident	
L Pe	rimeter Ditches/Off Sits Disc	harge	Applicable ((M)	
1.	Siltation Locati Areal extent Remarks	öz shown on site r Depti	nap Siltention n	O en klaat	
2.	Vegetative Growth. Vegetation does not imp Areal extent Remarks	Location shows ede flow Type		N/A	
3.	Erosios Areal extent Remarks	Location show Pepti		Exision not evident	
•	Discharge Structure Renarks	Pinclining			
i Propinsi Paga	VIIIs Vari	TCAL BARBIES	ewalds —	Applicable (MA)	Tries.
I,	Settlement Areal extent Remarks	Locatina distr Desth		Scallement pot evident	
	Performance Monitoring Performance not monitor Progressey Lical differential Remarks	1 ye of montod		American de la companya de la compan	

IX. GROUNDWATER	VSURFACE WATE	R REMEDIES	(pplicable)	NA
undwater Extraction Wells	, Pumps, and Pipell		Applicable	NVA
Good condition Remarks	All required wells p	hoberly oberating	Needs Maintena	DCC NVA
Extraction System Pipelin Cood condition Remarks			purtenances	# # # # # # # # # # # # # # # # # # #
Space Parts and Equipms -Readily available Remarks	ent Good condition	Requires upgrad	e Necels to be	prykied
rface Water Collection Stru	ctures Pumps, and	Pipelines Ap	plicable, (V	
Collection Structures, Pu Good condition Remarks				
Surface Water Collection Good condition Remarks			and Other App	nicens brees
Spare Parts and Equipm Readily available	uent Good condition	Require up.	k Nedsot	novided
	Pumps, Wellhead Plumble Good condition Remarks Extraction System Pipelis Good condition Remarks Spare Parts and Equipma - Readily available Remarks face Water Collection Structures, Puricipal Cood condition Remarks Surface Water Collection Remarks Surface Water Collection Remarks Spare Parts and Equipma Cood condition Remarks	Pumps, Weilhead Plumbing, and Electrical Clood condition Remarks Extraction System Pipelines, Valves, Valve Bo Cood condition Remarks Spare Parts and Equipment Cleadily available Cood condition Remarks face Water Collection Structures, Pumps, and Collection Structures, Pumps, and Electrical Good condition Remarks Surface Water Collection System Pipelines, Cood condition Remarks Surface Water Collection System Pipelines, Cood condition Remarks Surface Water Collection System Pipelines, Cood condition Remarks Spare Parts and Equipment	Cood condition Remarks Extraction System Pipelines, Valves, Valve Boxes, and Other Ap Cood condition Remarks Space Parts and Equipment -Resally available Cood condition Remarks Face Water Collection Structures, Pumps, and Pipelines Collection Structures, Pumps, and Electrical Good condition Remarks Surface Water Collection System Pipelines, Valve Boxes Good condition Remarks Space Parts and Equipment Space Parts and Equipment	Pumps, Wellhead Plumbing, and Electrical Good condition All required wells properly operating Needs Maintena Remarks Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances Good condition Needs Maintenance Remarks Spare Parts and Equipment - Readily systable Good condition Remarks face Water Collection Structures, Pumps, and Pipelines Collection Structures, Pumps, and Electrical Good condition Needs Maintenance Remarks Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other App Good condition Needs Maintenance Remarks Spare Parts and Equipment

1,840

C. T	reatment System	Applicable	NA	
1.	Metals removal Air stripping Filters	Cuiba	ner separation n adsorbers	Bioremediation
	Additive (e.g., che Othera	lation agent, flocculent)		
	Good condition Sampling poets pro Sampling/mainten Equipment proper Quantity of grouns	sperly marked and fund ance log displayed and v y identified iwater treated annually i water treated annually	p to date	
2.		a and Panela (properly Good condition	rated and functional) Needs Mainsenance	
3.	Tanks, Vaults, Stor NA Remarks	age Vessels Good condition	Proper secondary coul	alament Needs Maintenance
		raid Appurtesianes Cool condition	Needs Maintenance	
		(i) (i) (i) (i) (ii) (ii) (ii) (ii) (ii)		Neds repair
Ğ.	Monitoring Wells (e Properly secured/ All required wells Remarks	numb and treatment ren ceked Statemening looked Need	Countingly sampled Maintenance	Good condition N/A
	2007 100 THE TOTAL TO THE TOTAL			
D. M	onlioring Data			ali e
D. M 1.	Mosticing Date		k of acceptable of	palis.

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ii.

ei	Monitoring Wells (natural attenuation remedy)
	Properly secured/locked Functioning Routinely sampled Good condition
	All required wells located Needs Maintenance LNA
9 2 3 1.	& OTHER REMEDIES
ាំ	there are remedies applied at the site which are not covered above, attach an inspection sheet describing physical nature and condition of any facility associated with the remedy. An example would be soil por extraction.
**** * * * * * * * * * * * * * * * * *	XL OVERALL OBSERVATIONS
V.	Implementation of the Remedy
in Terror a	Describe issues and observations relating to whether the remedy is effective and functioning as.
	designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contamplisme, minimize infiltration and gas emission, etc.).
	SYSTEM HATTHIS TO MITHER & CONTROL
	VOL PUME FINCTIONING PROTURY BU
	CONCENTRATIONS IN DEED WELL OUTSIDE OF
	CONCENTRATIONS IN DEED WELL OUTSIDE OF TREATMENT AND INTENTIONS INCREASE
	CONCENTIONS IN DEEP WELL OUTSIDE OF TREATMENT AREA INDICATING INCREASE
	CONCENTIONS IN DEEP WELL OUTSIDE OF TREATMENT AREA INDICATING INCREASE
	TREATMENT AND INDICATING INCREASE
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	TREATMENT AREA INDICATING PNORMS
	CONCENTIONS IN DEEP WELL OUTSIDE OF TREATMENT AREA INDICATING INCREASE
	CONCENTIONS IN DEEP WELL OUTSIDE OF TREATMENT AREA INDICATING INCREASE BREENS 3 + 4 OFFICHTING CONSTANTEY AND AS 13 2 ON 3 WEEKS OFF ONE WEEK Adequacy of O&M Describe investment also continue related to the implementation and scope of O&M procedures. In
	CONCENTENTS IN DEEP WELL OUTSIDE OF TREATMENT AREA INDICATING INCREASE AREANS 3 + 4 OFFRATING CONSTANTLY TREAS 142 ON SWEEKS OF FOUR WEEK Adequacy of O&M Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-sum protectiveness of the remeits.
	Adequacy of O&M Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. WEEKLY MONITONING PEAL OUTS/106 Politics
B.	CONCENTENTS IN DEEP WELL OUTSIDE OF TREATMENT AREA INDICATING INCREASE AREANS 3 + 4 OFFRATING CONSTANTLY TREAS 142 ON SWEEKS OF FOUR WEEK Adequacy of O&M Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-sum protectiveness of the remeits.
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	Adequacy of O&M Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. WEEKLY MONITORING PARTICLES FOR
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C.	Early Indicators of Potential Remedy Problems
	Describe listness and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unsoficialist repairs, that suggest that the protectiveness of the remoty may be compromised in the intens. SYSTEMS CHARLES HAT IN USE DUE TO ENDOUGHOUT TANKS BEING FILLE OF WARDS. Attn. SPANAS BACK DN EINE SHALL BUTO PRICE NUMBERSHOOT DAKES DAKE DN EINE SHALL BUTO PRICE ON CHARGE DAKE PRESSURES IN MICAIEM ON SWE WELLS
D.	Opper tradities for Optimisation
	Describe possible opportunities for optimization in monitoring tasks or the operation of the renedy.
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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status, "N/A" refers to "not applicable.")

	DRMATION	
Site mine: CAMP ALLEN LANDFILL-LANGE	Date of inspection; 7-2	9-02
Location and Region: ACA ACORPOLE CA	EPAVID:	
Agency, office, or company feating the five-year covient. CHZMHIM-WAVY (LEAN)	Weather/femperature: うかな <i>Han _ Sロ</i> ルルツ	luares
Access controls	Monitored natural attituation Groundwater containment Vertical barrier walls CONSTRUCTIONS IN	<u>,-Pla</u> (105
Attachments: Inspection teatre mater attached	Site map attached	
THE STATE OF THE S	(Check all that apply)	
THE STATE OF THE S	(Check all that apply)	
	(Check all that apply) (Check all that apply) (Check all that apply) (Title	2-24
11. INTERVIEWS 11. O&M sile manager MARIC PSARCIR Literviewed Cally stoffics by plone Plio Problems, suggestions: Report attached 2. O&M staff MARIC PSARCIN	(Check-all that apply) (Check	
11. INTERVIEWS 1. O&M site manager MARIC PSACLIKE Name Interviewed. Calle stoffice, by plone Place Problems, suggestions; Report attached	(Cleck-II that apply) (Creat-All that apply) Title Title Title	79-32

	Agency Contact				tis Sentiti das Asparation
	Name Problems: suggrations;	Report strached	Title	Paris	Phone no.
	Agency Edition				
-31	Name Problems; suggestions;	Report stricted	Title	Date	Phone no.
૾૽	Agency				
. 2	Contact Name Problems, suggestions;	Reportational	Tric	Date	Plone 20.
	Agency Coulact				<u> </u>
	Name Problems; suggestions;	Report attached:	Tác 	Date	Phone no.
	Other Mary State (Con-	net) - Heron dallet		PT V sepander Terri ett 1. 2000. 1871	
Taren H					
# 1					** ** ** ** ** ** ** ** ** ** ** ** **
1361					66 2231 II. I

4	III. ON-SITE DOCUMENTS & REC			
ŧ.	O&M Documents O&M manual As-built drawings Maintenance logs Remarks	Readily svallable Readily svallable Readily svallable	Up to date Up to date Up to date	NA NA NA
	Site-Specific Health and Safety Plan. Contingency plan/emergency response plan Remarks	Keadily available Readily available	Up to date Up to date	N/A N/A
	O&M and OSHA Training Records Remarks	Readily evallable	Up to date	lWA.
k	Permits and Service Agreements			
	Air discharge permit	Restily svallable	Up to date	NA
	Riffluent discharge	Readily available Readily available	Up to date Up to date	NA_ NA_
	Waste disposal, POTW Other pennits Remarks	Readily available	Up to date	N/A
rija 18. japan				
	Cas Generation Records Readily Remarks	ravallable Up w	ciante V/A	
		Readily availables	date NVA	
74:	Remaria Settlement Monument Records	Readily available	Up to date	
6	Settlement Monument Records Remarks	Readily available	Up to date	
6	Sefficació Monument Records Remaris Croundwater Maniforiog Records Remaris Croundwater Maniforiog Records Remaris Leschate Extraction Records	Readily available Readily available (AV Long Co	Up to date:	

	<u> </u>	184.) <u>1 14.04.6</u> 3.	IV. O&M COSTS		Control of the contro	
State PRP	Organization e in-house in-house tral facility in-l	höuse	Contractor for State Contractor for PRI Contractue for Ped			
Read Punc	Cest Records fily available ling mechanism d O&M cost es	Up to d v/agreement to dinate	place	Paldoya Musched		
2 2 2 2 2 2		oud somal cos	t by year for review p	cekdif avallable	Sign	
Prom_	76			Breakdown	stacted.	
Prom	Date To	Date	Total cost	Breakdow	i attached	
From	Date To	Date	Total cost	Breakdown	remigeacheren	
From	Date	Date	Total cost		e generalis	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Date To_	Date:	Fotal cost	Breakdowi	्रिकाष्ट्रमञ्जयसम्बद्धाः । । । १९८८ - १९४० - १९४४	21.11
From_	Date	Dác	Total cost	Breakdown	attached	- '
Vezet	cipated or Ua	esually liigh (D&M Costs During	Review Feriod		
Descri	e cists and rea	grinet .				
<u> </u>			o (s. 1911) (Miles egilen (s. 19 Village (s. 1911)			
7		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Control of the contro		- FM	ncerningen, verez.
	V. ACCESS	AND INSTIT	TIMONAL CONTI	OR YEARS	a stransform	
deing.						
- Fencis	g domnged	Location		Clates sect	ed Zwystra	NA VOTO

-7	titutional Controls (ICs)				
•	Implementation and enfor Site conditions imply ICs no Site conditions imply ICs no	ot properly implemented	が 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Yes No	NA NA
	Type of monitoring (e.g., see Frequency	Af-reporting, drive by)			
1.5	Responsible party/agency Contact		2000 1000 1000 1000 1000 1000 1000 1000		
	Name		9	Date	Phone no.
	Reporting is up-to-date Reports are verified by the	lead agency		Yes No	X
	Specific requirements in de Violations have been report Other problema or suggesti TEMP: CONST.		1 12 PZ	(ca No	NA NA MŠAŽI
	Adoquacy Remarks	Ks are adequate	(Ca arc ins	Fepale /	WA.
		marini e igus de est adescrimit.	aturiariak dari 🖰 🗗	ini-vii iradibisa di	
D. Č					
	CORCAL Vasidalismy(respassing Remarks	Location shown on sit		Syndikin eyaka	
p č	Vasidallam/trespassing				
2	Vascallam/trespassing Remarks	Ø er install			
2	Vasidalism/trespassing benaries Land use change on site change of	Ø er install	ATION	UNDAY C	
2	Vasidalism/trespassing benaries Land use change on site change of	O STALL	ATION	UNDAY C	

В. О	ther Site Conditions		10 10 10 10 10 10 10 10 10 10 10 10 10 1	OSWER No. 9355.	7-03 <i>B-P</i>
	Remarka GITE, L DO INSTAT	S CORREDA A COBS	H UNDE	C CONSTRUCTOR AN THICKNIS	
	State of the second of the sec	LANDFILL COVERS	<u>Application</u>		
A., Li	indfili Swrface				
	Settlement (Low spots): Aireal extent Remarks	Location dio	MAC COL STID MADE	Schlenen et eriden	
2	Cracks Lengths Remarks		wn on site map pths	Cracking not evident	
	Erostoa Areal crient Remarks	Location sho Depth	Wil on site map	Bixision not evident	
	Holes Aveal extens Remerks	Location sion Despti	wa ou sile map	Lioles not evident	
3.	Vegetative Cover Trees/Shobs (indicate Remarks	Cires Cov size and locations on a di	a property establisi grain)	ed No signs of st	
6	Atternative Cover (Grant - Respectie	oyed rick, controls, cic.	NA		
7 £	Bulges Aveal extent Semanta	Location sho	racoa sibinar	Bulgos pot erides	

8.	Wet Areas/Water Damage Wet areas Ponding Sceps Soft subgrade Remarks	Wet areas/water damage not ex Location shown on site map Location shown on site map Location shown on site map Location shown on site map	vident Areal extent Areal extent Areal extent Areal extent Areal extent
	Slope Instability Slides Areal extent Remarks	Location shows on site map	No evidence of slope instabili
B. R.		NA ids of carth placed across a steep land ity of surface rusoff and intercept an	
I	Flows Bypass Bench Remarks	Location allows on alle map	NA er oliay
2.	Bench Breached L Remarks	ocation shown on site map	N/A or okay
3 3 •	Beack Overlopped Remaix	Location shown on site map	NA websy
	etdowa Channels: Applicable (Channel lined with crosion co side alone of the cover and will landfill cover without exemps	ntrol mata, riprati, groot-bags, or gabi I allow the mooff water collected by	ions that descend down the steep the benches to move off of the
1	Area extent	ocation shown on site map. No Depti.	o evidence of settlement
		ceston shown on site map: N Areal extent	o sydnic of degradalos

4.	Undercutting Areal extent Remarks	Location shown Depth	of site map	No evidence of undercuttin	B
	Obstructions Type. Location shown on sit Size. Remarks	E musu	Areal extint	No obstructions	
	Excessive Vegetative G No evidence of excess Vegetation in channel Location shown on sit "Remarks	sive growth \$ does not obstruct fl			
D, C	over Penetrations App	licable (NV)	UNDER	CONSTRUCTION	
	Gas Vents Properly secured/locks Evidence of leakage at N/A Remarks	Active ed Ponctioning	Passive Routinely samp		
	Gas Mouttoring Probes Properly scence Viocks Rytifence of leakage a Remarks	ed Punctioning	Routinely same Needs	ied Good condition Maintenance N/A	
	Monitaring Wells (with Pioperly secured/lock Systems of leakage a Rémarks	ed Punctioning	Routinely same	Fed Good spelition. Maintenance	
	Leachafe Extraction W Properly scentral lock Byttence of leakage a Remarks	sed Punctioning	ROAD DE SON	Sed Good condition. Mainfemence N/A	
	Settlement Monument Remarks		d kom		

E. G	s Collection and Treatment	Applicable	@	
	Gas Treatment Facilities Flaring Good condition Remarks	Thermal destruction Needs Maintenance	Collection for reuse	September 1997 Annual Property (September 1997)
	Gas Collection Wells, Man Good condition Remarks	lfolds and Piping Needs Maintenance		
	Gas Monitoring Facilities Good condition Remarks	(e.g., gas monitoring of Needs Maintenance	(*djecer bonter or buildings)	
 F. C	over Drainage Layer	Applicable	i v	
	Outlet Pipes Inspected Remarks	Punctioning	WA .	
2.	Outlet Rock Inspected Remarks	Punctioning		
G. I	etention/Sedimentation Pond	is Applicable		
	Silitation Areal extent Silitation not evident Remarks			William Committee on the Committee of th
2	Erosion Areal ex Erosion not evident Remarks			
	Onte Works	Propositioning N.		
*	Dana Remarks	Punctioning N		

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H, R	ctaining Walls	Applicable N/	Å	ender i de de la Militaria de la Companya del Companya del Companya de la Company	
	Deformations Librizonial displacement Rotational displacement Ramacka	Location shows on a Verdi	ike mao) cal displacem	Deformation not evide	
2.	Degradation Remarks	Location shown on s	ik-map	Degradation not evide	
l, Pe	rimeter Dileher/Off-Site Di	shirpe Al	plicable		
J.	Silfation Local Areal extent Remarks	tion shown on site map Depth	Silvation not	Cylides	
	Vegetative Growth Vegetation does not im Areal extent Remarks	Location shown on a pede flow Type		V A	
3.	Eroston Arcak essens Remark	Location shown on a Depth	ile map	Prosion pot evident	
	Discharge Structure Remarks	Fractions W			
	Viue ybr	TICAL BARRIER WA	uus 1	pplicable IVA	
	Settlement Aval extent Remark	Location show as Doub		Scutement not evident	
2	Performance Monitoria Performance not monitoria Frequency Head differential Remarks			reof bressing	

	IX. GROUNDWATER/SURFACE WATER REMEDIES	Applicable NA
A. Gro	undwater Extraction Wells, Pumps, and Pipelines	Applicable: NA
	Pumps, Welthead Plumbing, and Electrical Good condition All required wells properly operating Remarks	Needs Maintenance NA
	Extraction System Pipelines, Valves, Valve Boxes, and Other / Good condition Needs Maintenance Remarks	Applu tenaces
3.	Spare Parts and Equipment Readily available Good condition Requires upgo Remarks	side Needs to be provided
B. Sm	face Water Collection Structures, Pumps, and Pipelines	Applipable (NA)
	Collection Structures, Pumps, and Electrical Good condition Needs Maintenance Remarks	
2	Surface Water Collection System Pipelines, Valves, Valve Box Good condition Needs Maintenance Remarks	ses, and Other Appurtmances
	Spare Paris and Equipment Readly available Good condition Requires upg Remarks	rade Needs to be provided

C. Ti	ealment System	Applicable	N/A		
	Treatment Train (Ch Meals removal Air stripping Filora	Oil/s	apply) rater separation or adsorbers	Bioremedia	tion
	Additive (e.g., chets Otiers	tion agent, flocculen			
ta .	Good condition Sampling ports prop Sampling/maintena Equipment properly	erly marked and fun se log displayed and	up to date		
	Quantity of surface Remarks page 14	Water treated annuall			There (I)
	Electrical Enclosures		y rated and fluctional	TABATEN	
	Tanks, Vaults, Storag N/A Remarks	e //essets ood constition	Proper secondary	etija Kalikiinnent Ne	cis Maintenance
	Discharge Structura WA Regulatie	ad Appurientaces	Nexts Manual		
	Treatment Building(c N/A C C Chapteals and equa Remarks	od condition (see .n	ge and dougues	Noods repa	
	Monitoring Wells (pu Property secured/lox All required wells k Remarks	ked Functioning	sody) Routinely sample s Maintanance	l Coodcood	
. Ma	ontoring Data				
	Monitoring Data	o ments of	77A AVAILABL		
	Monitoring data sugge			Concentrations & Co	e-lining

	Monitoring Wells (natural attenuation remedy)
	Properly secured/locked Punctioning Routinely sampled Good condition
	All required wells located Needs Maintenance (NA)
	Remarks and the second of the
a projective de la company	X OTHER RIVIEDIES
th	there are remedies applied at the site which are not covered above, attach an inspection sheet describing e physical nature and condition of any facility associated with the remedy. An example would be soil por extraction:
	XI. OVERALL OBSERVATIONS
	Implementation of the Remedy
	Describe issues and observations relating to whether the remody is effective and functioning as designed. Begin with a brief statement of what the remody is to accomplish (i.e., to contain containment plants; inhimize infiltration and gas emission; etc.). LOW CHY RECENTLY COMPLETED BUT STILL VALUE OF SITE VISIT. ONE FOOT OF CLEAN FILL ADDED TO PROVIDE SEPARATION FROM SALVAGE VAND SOILS. ROUSEH CREEK COLVERT ISTORM DRAFN PRESING BENEATH SITE RECENTLY
	NOT COMPLETED AT TIME OF VISIT HYDROSIDEDI OF CAP COMPLETE: PERMANENT FENCE INSTALLATION INNOER SUR CONSTITACT Adequacy of O&M
	NOT COMPLETED AT TIME OF VISIT HYDROSEENI OF CAP COMPLETE; PERMANENT FENCE INSTAULATION INDEA SURCONTRACT
	OF CAR COMPLETE PERMANENT FENCE NSTALL ATION 1/NO EX. SUR CONTIL ACT Adequacy of O&M Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-serm protectiveness of the remedy.
	NOT COMPLETED AT TIME OF VISIT. HYDROSCEWA SE CAP COMPLETE PERMANENT FENCE ANSTALLATION INNO ENG. SUBCONTRACT Adequacy of O&M Describe issues and observations related to the limplementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remody. MONIE — CAT CONSTRUCTION NOT YET
	NOT COMPLETED AT TIME OF VISIT HYDROSCEWA SE CAP COMPLETE PERMANETUT FENCE ANSTALLATION IN VISIO SURCONTRACT Adequacy of O&M Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. MONIE — CAT CONSTRUCTION NOT YET
	NOT COMPLETED AT TIME OF VISIT. HYDROSCEWA SE CAP COMPLETE PERMANENT FENCE ANSTALLATION INNO ENG. SUBCONTRACT Adequacy of O&M Describe issues and observations related to the limplementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remody. MONIE — CAT CONSTRUCTION NOT YET
	SE CAP COMPLETE PERMANENT FENCE NSTALLATION IN DEAL SURGONTINARY Adequacy of O&M Describe issues and observations related to the limplementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remety. MONIE — CAT CONSTRUCTION NOT YET

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C,	Early Indicators of Potential Remedy Problems				
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.				
#指					
Ď.	Opportunities for Optimization				
	Describe possible opportunities for optimization in monitoring tasks or the operation of the namedy.				

Appendix C Site Inspection Photographs



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